

91 01300

v. 1



10/24/91

BAY AREA '91 CLEAN AIR PLAN

VOLUME 1

October 1991

UNIVERSITY OF CALIFORNIA

OCT 22 1991

INSTITUTE OF GOVERNMENTAL
STUDIES LIBRARY

Prepared by:
Bay Area Air Quality Management District
in cooperation with the
Metropolitan Transportation Commission
and the Association of Bay Area Governments



BAY AREA AIR QUALITY MANAGEMENT DISTRICT

November 6, 1991

BAY AREA 1991 CLEAN AIR PLAN

I. CHANGES

The Plan was duly adopted by the BAAQMD Board of Directors on October 30, 1991, after a public hearing. As part of the adoption process, the Board made the following changes to the Plan:

- 1) In Volume I, page 18, Table 3, TCM #17, insert "and communities" after "individual".
- 2) In Volume I, page 30, the paragraph on Global Warming, delete the phrase "At this time there is not a strong scientific consensus regarding global warming; however".
- 3) In Volume II, page F-56, third sentence, insert "or equivalent ordinance acceptable to the BAAQMD Board" after "Element."

II. ERRATA

Volume I

Page i, right side of page, first full paragraph, last sentence is revised as follows:

Proposed regulatory schedules are shown in Table 8.

Page 2, Figure 1, revise as follows (additions are underlined; deletions are struck):

Miscellaneous:	55	<u>57</u>
----------------	---------------	-----------

Page 2, Figure 2, revise as follows (additions are underlined; deletions are struck):

Indust./Commercial:	46	<u>14</u>
Other Vehicles:	436	<u>140</u>

Page 3, Table 1, projected CO emissions in 1997 for Miscellaneous - Other Sources should be 5 tons/day.

Page 6, left side of page, first paragraph, last sentence is revised as follows:

The regulatory schedule for the '91 CAP is provided in Table 8, and detailed descriptions of the measures are provided in Appendices F and G.

II. ERRATA, Volume I. (Continued)

Page 13, left side of page, last paragraph is revised as follows:

Recent actions by the California Air Resources Board (see page 29) will result in even cleaner new cars over the next decade. These measures, coupled with natural turnover in the vehicle fleet, will greatly reduce motor vehicle emissions (see Table 1). Nonetheless, the Bay Area is still expected to fall short of attainment of the state ozone standard. Therefore, in addition to stationary source control measures, transportation control measures are proposed.

Pages 21 and 22, Table 4, column headings are revised to be RHC rather than RHX.

Page C-1, left side of page, 3rd paragraph, last sentence is revised as follows:

The total emissions of RHC and NO_x in the 1987 inventory are approximately 75 tons/day and 132 tons/day, respectively.

Page C-1, left side of page, 5th paragraph, 2nd sentence is revised as follows:

The total 1987 RHC emissions from these sources is 64 tons/day, which represents about 85% of the point source inventory.

Page C-2, Table C-1, revise the RHC emissions attributed to Petroleum Refining Processes from 27.5 tons/day to 22.4 tons/day, revise total RHC emissions from 80.3 tons/day to 75 tons/day, and revise total NO_x emissions from 131.6 tons/day to 132 tons/day.

Page C-2, Table C-2, revise title of table as follows (additions are underlined):

EMISSIONS FROM PERMITTED POINT SOURCES REGULATED BY THE
DISTRICT'S REGULATION 8 RULES

Page C-2, Table C-2, note that tons/day figures are based on the annual average inventory.

Page C-2, Table C-2, revise the tons/day attributed to the following rules as shown below:

<u>Rule Number and Rule Title</u>	<u>Tons/day</u>
18 Valves and Flanges at Petroleum Refinery Complexes	11.4
25 Pump and Comp. Seals at Pet Refineries & Chem Plants	2.3
28 Pres. Relief Valves at Petro. Refineries & Chem Plants	0.5

Page C-3, Table C-2 (con't), change total tons/day from 69 to 64.

GS27

UNIVERSITY OF CALIFORNIA
INSTITUTE OF GOVERNMENTAL STUDIES
BERKELEY, CALIFORNIA 94720

BAY AREA

'91 CLEAN AIR PLAN

VOLUME I

October 1991

SUMMARY

This is a plan to reduce ozone and carbon monoxide (CO) air pollution in the San Francisco Bay Area. This plan, called the Bay Area 1991 Clean Air Plan (CAP) covers the period extending from CAP adoption, expected in October of 1991, to the next California air quality planning update, expected in 1994. It also includes projections of pollutant trends and possible control activities beyond 1994.

The CAP was developed by the Bay Area Air Quality Management District, in cooperation with the Association of Bay Area Governments and the Metropolitan Transportation Commission, in response to the California Clean Air Act of 1988. The goals of the '91 CAP are to reduce the health impacts from ozone and CO levels above state ambient standards and to comply with the California Clean Air Act. The act requires air districts that exceed state air quality standards to reduce pollutant emissions by 5% per year, calculated from 1987, or take all feasible measures to achieve emission reductions.

The control measures proposed in the '91 CAP constitute all feasible measures for the reduction of carbon monoxide and ozone precursor emissions in the Bay Area.

With the implementation of the '91 CAP, carbon monoxide emissions, which come primarily from motor vehicle exhaust, will be reduced by about 4% per year, and the CO standard should be attained by about 1995, depending on weather patterns and availability of oxygenated fuels.

Population exposure to ozone above the state standard will be cut in half by 1994, and the Bay Area is expected to attain the federal standard before 1997. Ozone precursors--reactive organics and oxides of nitrogen--will be reduced by about 4.0% per year and 2.6% per year, respectively, over the planning period 1987 - 1994.

The strategy builds upon statewide motor vehicle control requirements, and extends to:

- more stringent controls on polluting industries and businesses;

- reformulation of paints, varnishes, and consumer products to reduce volatile pollutant content;
- programs to reduce automobile use, to reduce traffic congestion, and to improve mobility;
- efforts to improve public transit systems and to encourage development patterns that make transit a better alternative; and
- programs to identify and repair highly polluting cars and trucks.

The actual measures proposed are listed in the Proposed Control Measures and Programs section. More details are provided in Appendices F and G. Proposed regulatory schedules are shown in the section entitled State and Federal Programs That Contribute to '91 Cap Goals.

This Plan reflects the BAAQMD staff's projection of future regulatory activity. However, as "planned activities," proposals are subject to the workshop process, District Board consideration, ARB approval, and possibly EPA approval, prior to implementation. Accordingly, the proposals contained within the Plan are subject to modification and should be reviewed with this in mind.

Ozone and carbon monoxide are not the only air quality problems in the Bay Area, but they are the pollutants of concern in this Plan. Particulate matter, toxic air pollutants, stratospheric ozone depletion, and other air quality problems are addressed through BAAQMD programs outside of this Plan.

Major benefits of the CAP will be (a) reduced health impacts from population exposure to carbon monoxide and ozone and (b) reduced traffic congestion. Additional expected benefits are reductions in airborne particulate matter, energy use, global warming, crop damage, and water pollution.

Costs are estimated to be about \$700 million dollars to industry and business. Costs to the public will be about \$3 billion. These costs will be partially offset by travel time savings and by the fact that much of the cost represents transfers within the local economy.

Table of Contents

SUMMARY	i
ABBREVIATIONS AND TERMINOLOGY	iv
INTRODUCTION	1
SOURCES OF AIR POLLUTION	2
LEGAL REQUIREMENTS	4
STRATEGY	5
PROPOSED CONTROL MEASURES AND PROGRAMS	6
Stationary Source Control Measures	6
Transportation Control Measures	6
Emission Reductions	20
Need for New Legislation	23
COST-EFFECTIVENESS ESTIMATES	25
Benefits and Costs of the Plan	25
STATE AND FEDERAL PROGRAMS THAT CONTRIBUTE TO '91 CAP GOALS	29
OTHER ISSUES	30
PM10	30
Toxic Air Contaminants	30
Global Warming	30
Stratospheric Ozone	30
Federal Planning Requirements	31

ABBREVIATIONS AND TERMINOLOGY

'91 CAP	1991 Clean Air Plan	I&M	Inspection & Maintenance (or "Smog Check" program)
ABAG	Association of Bay Area Governments	MTC	Metropolitan Transportation Commission
ARB	(California) Air Resources Board	NOx	Nitrogen oxides or oxides of nitrogen
AVR	Average Vehicle Ridership	PM-10	Particulate matter less than 10 microns
BAAQMD	Bay Area Air Quality Management District	pphm	Parts per hundred million
BARCT	Best Available Retrofit Control Technology	ppm	Parts per million
BART	Bay Area Rapid Transit District	PUC	Public Utilities Commission
CARB	California Air Resources Board	RHC	Reactive hydrocarbons (actually: photochemically reactive organic compounds)
CCAA	California Clean Air Act	RIDES	RIDES for Bay Area Commuters
CMA	Congestion Management Agency	TCM	Transportation control measure
CMP	Congestion Management Program	TMA	Transportation Management Association
CO	Carbon Monoxide	VMT	Vehicle miles traveled
HC	Hydrocarbons		

INTRODUCTION

Pollutants in the air can cause health problems--especially for children, the elderly, and people with heart or lung problems. Impaired respiratory function and cardiac stress are the most common health impacts of ozone and carbon monoxide pollution. Healthy adults may experience symptoms during periods of intense exercise. The State of California has set numerical standards to define unhealthful levels of air pollution. The relevant standards are: ozone (O₃)* should not exceed .09 parts per million over a one-hour average and carbon monoxide (CO) should not exceed 9 parts per million over an eight-hour average.

In most parts of the San Francisco Bay Area, air quality is good and is improving. Nevertheless, state standards are sometimes exceeded. In recent years, the ozone standard has been exceeded 10 to 20 times per year on hot summer days in the inland valleys of the Bay Area. The carbon monoxide standard has been exceeded 5 to 10 times per year on cold winter nights in San Jose, and less frequently in Vallejo and San Francisco.

Because we sometimes exceed the state ozone and carbon monoxide standards, we have prepared this 1991 Clean Air Plan. This Plan is the first in a series to be prepared at approximate three-year intervals, as required by state law. The '91 CAP covers the period from 1991 through 1994. Measures proposed for 1995 and beyond will be reconsidered in the comprehensive updates expected in 1994 and 1997.

The CAP was prepared by the Bay Area Air Quality Management District in cooperation with the Association of Bay Area Governments and the Metropolitan Transportation Commission. It responds to requirements of the California Clean Air Act (CCAA) of 1988 and a related law, AB 3971 (Cortese, 1988).

The CCAA set the overall air quality planning requirements statewide. AB 3971 defined a process to be applied only in the Bay Area, whereby the transportation control measures required in the CCAA would be developed through a joint process between BAAQMD and MTC.

* Note that ozone near the ground is an air pollutant--an oxidizing agent harmful to people, animals, plants, and many materials. The same chemical compound in the stratosphere, about 10 miles above the earth's surface, plays a beneficial role in protecting us from excessive ultraviolet radiation. Surface ozone and stratospheric ozone are independent phenomenon, and the intent of this plan is to reduce surface ozone only.

SOURCES OF AIR POLLUTION

There are literally millions of sources of air pollution in the Bay Area, ranging from industrial smoke stacks and motor vehicles, to individual use of personal grooming products, household cleaners, and paints. The earth, itself, and its plant and animal life are natural sources of air pollutants.

The source inventory summary in Table 1 and Figures 1, 2, and 3 presents the District's best estimates of the total air pollutant emissions from human activities. In the Bay Area, human activity, or "anthropogenic" sources, are significantly greater than natural sources. The data presented are for 1987, the defined base year for state air quality planning, and for selected future years. Some sources of air pollution are measured directly, but most are estimated based on source characteristics, throughput rates, partial sampling, and scientific or engineering calculations. Appendix H and the BAAQMD Inventory Methodology document provide more details on the inventory process and its results.

Motor vehicle emission calculations include consideration of the fleet mix (vehicle type, model year, and accumulated mileage), miles traveled, speeds, and vehicle emission factors, as developed from comprehensive ARB testing programs. All of these variables change from year to year, and the projections are based upon expected changes.

Figure 1
1987 Emissions: Ozone precursors -Reactive Hydrocarbons
(677 tons/day)

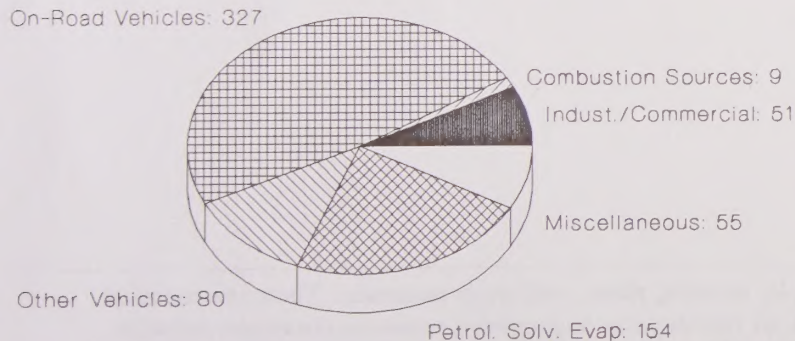


Figure 2
1987 Emissions: Ozone precursors -Oxides of Nitrogen
(662 tons/day)

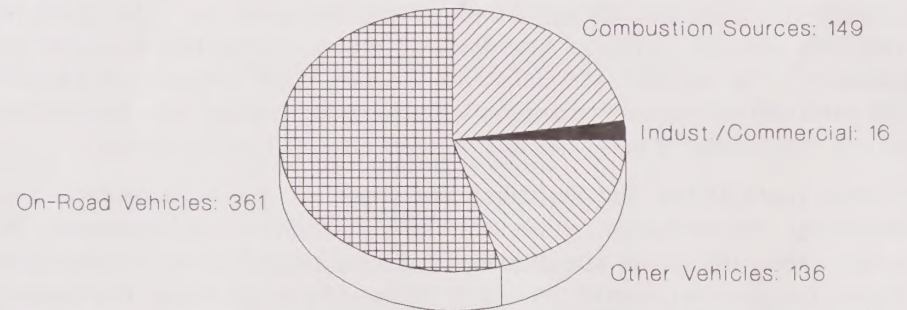


Figure 3
1987 Emissions: Carbon Monoxide
(3830 tons/day)

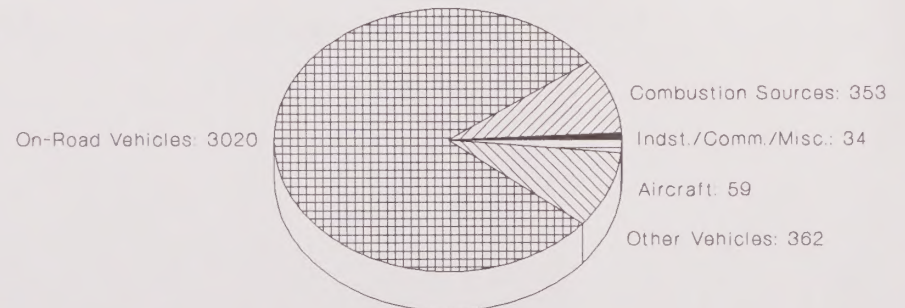


Table 1 shows inventory projections for the years 1994, 1997, and 2000. These projections are based on expected growth rates in population, employment, industrial/commercial activity, travel, and energy use, under environmental controls already adopted. They do not include the new measures proposed in the '91 CAP.

Table 1
Bay Area Baseline Emission Inventory Projections : 1987-2000
Planning Inventory (Tons/Day)*

	1987			1994			1997			2000		
Base Year 1987	RHC ¹	NOx ²	CO ³	RHC	NOx	CO	RHC	NOx	CO	RHC	NOx	CO
Industrial/Commerical Processes/Facilities												
Petroleum Refining Facilities	24	11	2	24	12	2	25	12	2	26	13	2
Chemical Manufacturing Facilities	5	2	28	5	2	31	6	2	33	6	3	34
Other Industrial/Commercial Processes/Facilities	22	1	--	16	1	--	17	1	--	17	1	--
Petroleum Product/Solvent Evaporation												
Petroleum Refinery Evaporation	10	--	--	6	--	--	6	--	--	6	--	--
Fuels Distribution	25	--	--	25	--	--	25	--	--	25	--	--
Other Organic Compound Evaporation	119	--	--	108	--	--	113	--	--	116	--	--
Combustion — Stationary Sources												
Fuel Combustion	8	148	351	8	139	380	9	145	392	9	152	405
Burning of Waste Material	1	1	2	1	1	3	1	7	9	1	7	9
Combustion — Mobile Sources												
Off-Highway Mobile Sources	63	124	362	71	133	419	70	139	443	70	143	462
Aircraft	17	16	59	18	18	68	19	18	71	19	19	74
On-Road Motor Vehicles	327	361	3020	167	248	2250	137	222	1940	110	202	1690
Miscellaneous — Other Sources	57	--	4	51	--	4	53	--	--	53	--	5
Banking	--	--	--	8	7	6	8	7	6	8	7	6
Grand Total	677	662	3830	507	561	3160	487	554	2800	467	546	2690

* Anthropogenic or man-made ozone precursors (RHC & NOx) for summer operating day (does not include about 300 tons/day RHC from natural sources); CO emissions for winter operating day. Entries are rounded to three (or less) significant figures. '91 CAP measures not included.

¹ RHC = reactive hydrocarbons (photochemically reactive organic compounds)

² NOx = oxides of nitrogen (nitric oxide and/or nitrogen dioxide)

³ CO = carbon monoxide

LEGAL REQUIREMENTS

The California Clean Air Act of 1988 expanded the scope and accelerated the pace of air pollution control efforts in California. The basic intent of the act is to establish a planning process that will result in attainment of the state's health-based ambient air quality standards at the earliest practicable date. If possible, District plans should achieve a reduction in districtwide emissions of 5% per year for each nonattainment pollutant or its precursors (Sec. 40914). As an alternative strategy, the adoption of all feasible measures on an expeditious schedule is acceptable even if a district is unable to achieve a 5% annual reduction (Sec. 40914 [b] [2]).

Other legal requirements applicable to the Bay Area include the following:

- Indirect source and area source control programs
- Emissions tracking systems
- A regional public education program
- Best available retrofit controls (BARCT) on existing stationary sources
- Transportation controls to achieve a 1.5 average vehicle ridership during weekday commute hours by 1999 and no net increase in motor vehicle emissions after 1997 (Sec. 40920 [a] [2])

- A permitting program designed to achieve no net increase in emissions from permitted sources
- Measures to reduce population exposure to ambient pollutant levels in excess of the standard by 25% by 1994, 40% by 1997, and 50% by 2000
- An assessment of cost-effectiveness of proposed control measures (Sec. 40922)
- Transport mitigation requirements (Sec. 39610 [b])

Because the Bay Area cannot demonstrate attainment of the state ozone standard by 1997, we are subject to the requirements for "severe" areas. The larger urbanized areas of California share this classification.

After ARB approval of the Plan, additional or continuing legal requirements will include:

- An annual regulatory schedule (Sec. 40923)
- An annual progress report on control measure implementation and, every third year, an assessment of the overall effectiveness of the program (Sec. 40924)
- A review of the Plan every three years to correct for deficiencies and to incorporate new data, with submission of a comprehensive update in 1998 (Sec. 40925)

STRATEGY

The overall goal of this planning process is to reduce the health impacts of ozone and carbon monoxide in ambient air. The District's goal is to reduce per capita exposure to pollutant levels above the state standards by 50% by 1994 and by 75% by 1997.

The strategy for this air quality plan is to implement all feasible measures on an expeditious schedule in order to reduce pollutant emissions as quickly as possible.

Areas that cannot achieve the 5% per year pollutant reduction target specified in the California Clean Air Act can comply with an alternative requirement of the act, Section 40914 (b) (2), which requires that a Plan include every feasible measure and an expeditious adoption schedule.

Neither "feasible" nor "expeditious" is defined in the act. For the '91 CAP:

Feasible measures are those measures which are 1) reasonable and necessary for the San Francisco Bay Area, 2) capable of being implemented in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors, and 3) approved or approvable by the California Air Resources Board, based upon state law and ARB policies.

An expeditious adoption schedule is the adoption of eight Plan measures per year.

The definition of feasible was derived from common usage meanings, the definition used in a related area of state law, and Air Resources Board guidance (see Appendix A for details). The BAAQMD will also periodically review control measures adopted and implemented by other California air districts, in order to identify additional measures that may be applicable in the Bay Area.

The strategy also includes the related objectives below:

- Implementation of a no net increase permit system in 1991
- Adoption by January 1, 1994, of rules requiring best available retrofit control technology on permitted sources representing 75% of the 1987 ozone precursor inventory

These actions are required to satisfy ARB regulations for mitigation of air pollutant transport to other districts.

Finally, the strategy includes adoption of transportation control measures to achieve by 1999 an average of 1.5 persons per passenger vehicle during commute hours.

Given a strategy to implement all feasible measures on an expeditious adoption schedule, the treatment of contingency measures must be considered. Section 40915 of the act requires that contingency measures be adopted if ARB finds that a district fails to achieve or maintain adequate progress toward its reduction goals.

In the past, some districts have maintained a separate list of contingency measures to be adopted if one or more of the core measures in the plan did not produce the expected results. These contingency measures were usually more costly or more difficult to implement, and therefore had not been included in the core measure list at the time of plan adoption. In the current planning process, it does not make sense to identify contingency measures that are not deemed feasible at the time of plan adoption but that might later be inserted into the regulation adoption sequence in preference to other scheduled feasible measures. Therefore, the contingency procedure for the Bay Area '91 CAP is the following:

1. The BAAQMD and cooperating agencies will strive to adopt and implement measures on the schedules set forth in this Plan and subsequent annual regulatory schedules.
2. When a Plan measure cannot be adopted or implemented, the District will accelerate, to the extent possible, the rule adoption and implementation process for the subsequent rule(s).
3. In the annual progress reports required under Section 40924, the BAAQMD will report on the rule adoption process, including any delays or failures, and describe efforts to accelerate development and adoption of subsequent feasible measures.
4. If additional measures not currently in this Plan are identified as feasible, would achieve significant emission reductions, and would be more cost-effective than some measures already in the Plan, the BAAQMD will incorporate those measures into the annual regulatory schedules with a priority commensurate with their superiority to the other Plan measures awaiting adoption.

PROPOSED CONTROL MEASURES AND PROGRAMS

This section summarizes the new control measures and programs in the '91 CAP and the expected activities for subsequent triennial updates through 1997. The regulatory schedule for the '91 CAP is provided in State and Federal Programs section, and detailed descriptions of the measures are provided in Appendices F and G.

Stationary Source Control Measures

A comprehensive list of potential stationary source controls was compiled from suggestions by BAAQMD employees and others and from the literature and proposals of other jurisdictions. These were screened for total emission reduction potential, rate of reduction, cost-effectiveness (see Cost-Effectiveness Estimates section), public acceptability, and enforceability. The following listed measures constitute all feasible measures for the Bay Area.

Existing BAAQMD regulations, plus the new stationary source proposals in the CAP, cover all the applicable measures on ARB's "List of Feasible Measures for Stationary Sources" (March 1991). A few measures on the ARB list are not included because no corresponding sources (such as kelp-processing) exist in the Bay Area.

Table 2 lists the stationary source control measures to be developed and proposed for adoption. Included in the table are:

- Brief descriptions of proposed measures
- Estimated cost-effectiveness
- Estimated potential emission reductions
- Projected implementation dates
- Ratings of technical feasibility, public acceptability, and enforceability
- Proposed adoption dates

The BAAQMD will be the responsible implementing agency for all of the stationary source control measures, except A17 (Control of Emissions from Household Solvent Disposal) and B4 (Further Reductions from Gasoline Delivery Vehicles). A17 would be implemented by cities and counties; B4 is under the jurisdiction of the ARB.

Measures H1 and H3 are not stationary source controls, but they are included in Table 2 because they are BAAQMD programs (for smoking vehicles and fleet vehicles).

More detailed information on the measures is available in Appendix G (Volume III of the CAP).

Transportation Control Measures

Motor vehicles are the major source of air pollution in the Bay Area (see Table 1). They currently produce about 85% of the carbon monoxide and 50% of the ozone precursors in the region. This section addresses measures to reduce emissions from motor vehicles by reducing vehicle use.

CCAA Transportation Requirements

The California Clean Air Act (CCAA) states that, in developing attainment plans, air districts shall "focus particular attention on reducing the emissions from transportation and areawide emission sources" (Sec. 40910). The Act specifically requires air districts to adopt, implement, and enforce transportation control measures (TCMs). TCMs are defined as "any strategy to reduce vehicle trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing motor vehicle emissions" (Sec. 40717[g]).

ARB released a list of "reasonably available" TCMs in CCAA Guidance #2 (February 1990). The measures include employer-based trip reduction rules, trip reduction rules for other sources that attract vehicle trips, management of parking supply and pricing, regional high occupancy vehicle (HOV) system plans, comprehensive transit improvement for bus and rail, land development policies that support reductions in vehicle trips, and development policies to strengthen on-site transit access for new and existing development.

Because the Bay Area has a "severe" classification, the CCAA also requires that TCMs be sufficient to meet three specific transportation performance standards:

Table 2

1991 CLEAN AIR PLAN STATIONARY SOURCE CONTROL MEASURES

ID#	TITLE OF CONTROL MEASURE	Cost Effectiveness \$/ton-reduced	Total ER Potential tons/day	Rate of Reduction imp. date	Technolog. Feasibility A thru D	Public Acceptance A thru D	Enforce. A thru D	Proposed Adoption
A.	SURFACE COATING AND SOLVENT USE							
A1	IMPROVED ARCHITECTURAL COATINGS RULE (a) Lower VOC-limits for some specialty coatings (b) Eliminate small container exemption	\$2000 \$2000	.92 - 1.3	2000 + 9/97	D D	B B	B B	2000 + 95 - 97
A2	IMPROVED INDUSTRIAL MAINTENANCE COATINGS RULE (a) Lower VOC-limits for some coatings	\$2000	.62 - .94	2000 +	D	A	B	2000 +
A3	IMPROVED AEROSPACE COATINGS RULE (a) Set transfer efficiency standards (b) Lower VOC-limits for some specialty coatings	savings \$2000	.31 - .44	7/94 1/97	B D	A A	C B	1992 95 - 97
A4	IMPROVED WOOD FURNITURE AND CABINET COATINGS RULE (ADOPTED) (a) Establish VOC-limits for coatings (b) Eliminate small user exemption	\$2000 \$2000	5.8 - 6.5	7/96 10/91	C C	B B	B B	1991 1991
A5	IMPROVED SURFACE COATING OF MISC. METAL PARTS AND PRODUCTS RULE (a) Set transfer efficiency standards (b) Lower VOC-limits for some specialty coatings	savings \$2000	.30 - .41	7/94 1/96	B D	A A	C B	1992 95 - 97
A6	IMPROVED SURFACE COATING OF PLASTIC PARTS AND PRODUCTS RULE (a) Set transfer efficiency standards (b) Lower VOC-limits for some coatings	savings \$2000	.32 - .43	7/94 1/96	B D	A A	C B	1992 95 - 97
A7	IMPROVED CAN AND COIL COATING RULE (a) Lower VOC-limits for some coatings	\$2000	.38 - .76	1/96	D	A	B	95 - 97
A8	IMPROVED MAGNET WIRE COATING OPERATIONS RULE (a) Modify or eliminate exemptions	\$2000	.12 - .14	1/97	C	A	B	95 - 97
A9	IMPROVED AUTOMOBILE ASSEMBLY COATING OPERATIONS RULE (a) Require add-on controls on some coating operations (b) Lower VOC-limits for some coatings	\$19,000 \$2000	.74 - 1.1	2000 + 2000 +	B D	A A	A B	2000 + 2000 +
A10	IMPROVED GENERAL SOLVENT AND SURFACE COATING RULE (a) Establish VOC-limits for coatings (b) Modify mass emission limits	\$2000 unknown	.25 - .38	1/95 1/95	B B	A A	B B	1994 1994

Table 2 (con't)

1991 CLEAN AIR PLAN STATIONARY SOURCE CONTROL MEASURES (con't)

ID#	TITLE OF CONTROL MEASURE	Cost Effectiveness \$/ton-reduced	Total ER Potential tons/day	Rate of Reduction imp. date	Technolog. Feasibility A thru D	Public Acceptance A thru D	Enforce. A thru D	Proposed Adoption
A11	FURTHER CONTROL OF EMISSIONS FROM ADHESIVES USE (a) Establish VOC-limits for adhesives (b) Set transfer efficiency standards (c) Set standards for cleanup operations	\$2000 \$2000 savings	1.7 - 1.9	7/94 12/92 12/92	B B B	A A A	A C C	1992 1992 1992
A12	ELIMINATION OF COATINGS RULES ALTERNATIVE EMISSION CONTROL PLANS (a) Eliminate or modify AECP provisions in Reg. 8 Rules	\$2000	.17 - .35	7/95	C	A	A	1994
A13	IMPROVED GRAPHIC ARTS PRINTING OPERATIONS RULE (a) Lower VOC-limits for fountain solutions (b) Require automatic blanket for large presses (c) Lower VOC-limits for inks (d) Require enclosed doctor blades	unknown savings \$2000 unknown	.19 - .26	7/94 7/95 7/95 7/95	B A C A	A A A A	A A A A	1993 1993 1993 1993
A14	IMPROVED COATINGS AND INK MANUFACTURING RULE (a) Abate emissions from large mixing operations (b) Eliminate the small manufacturer exemption (c) Require reduced emissions from vat cleaning	\$6000 (a-b) savings	.50 - .67	1/99 7/93 7/93	B B B	A A A	C A C	98 - 2000 1991 1991
A15	IMPROVED RESIN MANUFACTURING RULE (a) Abate pellet extrusion and final product packaging	unknown	unknown	2000 +	B	A	A	2000 +
A16	IMPROVED SEMICONDUCTOR MANUFACTURING OPERATIONS RULE (a) Abate emissions from positive photoresist operations (b) Abate emissions from solvent cleaning performed with coating-type applicators	\$4000 (a-b)	.07 - .08	1/99 1/99	A A	A A	A A	98 - 2000 98 - 2000
A17	CONTROL OF EMISSIONS FROM HOUSEHOLD SOLVENT DISPOSAL (a) Encourage Cities and Counties to implement programs for proper disposal of VOC-containing household wastes	unknown	.22	7/98	B	B	D	98 - 2000
A18	SUBSTITUTE SOLVENTS USED FOR SURFACE PREPARATION/CLEANUP OF COATINGS (a) Set VOC/volatility limits for surface preparation solvents (b) Set VOC/volatility limits for cleanup solvents	\$1100 (a-b)	7.6 - 11.4	1/96 7/97	B C	A A	C C	95 - 97 95 - 97
A19	ULTRA-LOW VOC COATINGS (a) Set VOC-limits for coatings based on Vernonia oil substitution and/or UV curable	unknown	20.2 - 21.3	2000 +	D	B	A	2000 +
B.	FUELS/ORGANIC LIQUIDS STORAGE AND DISTRIBUTION							

Table 2 (con't)

1991 CLEAN AIR PLAN STATIONARY SOURCE CONTROL MEASURES (con't)

ID#	TITLE OF CONTROL MEASURE	Cost Effectiveness \$/ton-reduced	Total ER Potential tons/day	Rate of Reduction imp. date	Technolog. Feasibility A thru D	Public Acceptance A thru D	Enforce. A thru D	Proposed Adoption
B1	CONTROL OF EMISSIONS FROM RAILCAR LOADING (a) Require vapor recovery systems on railcar loading of organic liquids	\$4000	unknown	7/96	B	A	C	1994
B2	IMPROVED STORAGE OF ORGANIC LIQUIDS RULE (a) Adopt more stringent standards for cone roof tanks (b) Lower or replace small tank exemption with a throughput exemption (c) Require better tank seals/more frequent seal inspections (d) Set tank color requirements (e) Require vapor recovery for certain tanks (f) Require compliance-based floating roof tank vapor recovery retrofit (g) Require emissions to be controlled during tank cleaning	\$2000 (a-g)	1.0 - 1.3	7/95 7/95 7/92 7/96 7/96 1/98 7/93	B B A B B B A	A A A A A A A	A A C A A A B	95 - 97 95 - 97 1992 95 - 97 95 - 97 95 - 97 1992
B3	IMPROVED ORGANIC CHEMICAL TERMINALS AND BULK PLANTS RULE (a) Reduce emission standard for non-gasoline bulk terminals and plants	savings	.19 - .28	1/94	B	A	A	1993
B4	FURTHER EMISSION REDUCTIONS FROM GASOLINE DELIVERY VEHICLES (a) Increase stringency of gasoline cargo tank vapor recovery requirements	savings	.05 - .07	1/96	A	A	B	95 - 97
B5	LIMITATIONS ON MARINE VESSEL TANK PURGING (a) Require control of ballasting and housekeeping emissions	\$4200	1.3 - 1.4	1/94	B	A	C	1993
B6	CONTROL OF EMISSIONS FROM CLEANING-UP ORGANIC LIQUIDS (a) Require control of emissions from cleaning storage tanks, vessels, and VOC spills	\$42,000	unknown	1/99	A	A	C	98 - 2000
B7	CONTROL OF EMISSIONS FROM PROPANE HANDLING (a) Require propane tanks to be filled by pumping (b) Ban uncontrolled venting during servicing	unknown unknown	unknown	2000 + 2000 +	D D	C C	A D	2000 + 2000 +
C.	REFINERY AND CHEMICAL PLANT PROCESSES							
C1	IMPROVED PRESSURE RELIEF VALVES AT REFINERIES AND CHEMICAL PLANTS RULE (a) Require venting to abatement devices and/or rupture disks with tell-tale indicators	\$10,000	.36 - .48	1/94	A	A	B	1993

Table 2 (con't)

1991 CLEAN AIR PLAN STATIONARY SOURCE CONTROL MEASURES (con't)

ID#	TITLE OF CONTROL MEASURE	Cost Effectiveness \$/ton-reduced	Total ER Potential tons/day	Rate of Reduction imp. date	Technolog. Feasibility A thru D	Public Acceptance A thru D	Enforce. A thru D	Proposed Adoption
C2	IMPROVED PUMP AND COMPRESSOR SEALS AT REFINERIES AND CHEMICAL PLANTS RULE (a) Require leakless seals (b) Adopt a more stringent leak definition	\$2000	.86 - .96	7/95 7/92	A A	A A	A C	95 - 97 1991
C3	IMPROVED VALVES AND FLANGES AT REFINERIES AND CHEMICAL PLANTS RULES (a) Require leakless valves (b) Improve inspection and maintenance requirements (c) Adopt a more stringent leak definition	\$1000 (a-c)	1.8 - 2.5	7/95 7/92 7/92	A A A	A A A	A C C	95 - 97 1991 1991
C4	IMPROVED PROCESS VESSEL DEPRESSURIZATION RULE (a) Improve depressurization standards (b) Set blowdown sizing requirements	\$1000 unknown	.03 - .07	7/99 7/99	C C	A A	B A	98 - 2000 98 - 2000
C5	IMPROVED WASTEWATER (OIL-WATER) SEPARATORS RULE (a) Remove small wastewater separator exemption (b) Require large units to be vented to abatement devices	\$1000 \$3000	2.4 - 2.5	7/98 1/98	B B	A A	A A	98 - 2000 95 - 97
C6	FURTHER CONTROL OF EMISS. FROM WASTEWATER TREATMENT AT REFINERIES (a) Require treatment systems to be enclosed and abated or control wastewater stream (b) Require covers for holding tanks, wastewater processing equipment (c) Require controls for hydrocarbon pond desludging	\$10,000 (a-c)	1.7 - 1.8	7/99 7/95 7/95	A A A	A A A	A A A	98 - 2000 95 - 97 1994
C7	CONTROL OF EMISSIONS FROM PETROLEUM REFINERY FLARES (a) Increase the capacity of blowdown recovery (b) Improve flare design and operating parameters	unknown unknown	.19 - .22 (R) .07 - .09 (N)	1/99 1/99	B C	A A	A A	98 - 2000 98 - 2000
D.	COMBUSTION OF FUELS							
D1	CONTROL OF EMISSIONS FROM NON-UTILITY RECIPROCATING ENGINES (a) Adopt NOx controls similar to existing SCAQMD Rule 1110.2	\$9300	(NOx) 6.6 - 8.5	12/96	A	B	B	1992
D2	CONTROL OF EMISSIONS FROM STATIONARY GAS TURBINES (a) Adopt NOx controls similar to existing SCAQMD Rule 1134	\$12,000	(NOx) 6.5 - 6.9	12/96	A	B	B	1993
D3	CONTROL OF EMISSIONS FROM ELECTRIC POWER GENERATING BOILERS (a) Adopt NOx controls based on add-on flue gas controls	\$14,000	(NOx) 12.0 - 13.5	12/98	B	B	B	1993

Table 2 (con't)

1991 CLEAN AIR PLAN STATIONARY SOURCE CONTROL MEASURES (con't)

ID#	TITLE OF CONTROL MEASURE	Cost Effectiveness \$/ton-reduced	Total ER Potential tons/day	Rate of Reduction imp. date	Technolog. Feasibility A thru D	Public Acceptance A thru D	Enforce. A thru D	Proposed Adoption
D4	CONTROL OF EMISS. FROM BOILERS STEAM GENERATORS AND PROCESS HEATERS (a) Adopt NOx controls similar to existing SCAQMD Rule 1146 (1) Large Units (100 MMBTU/hr or larger) (2) Smaller Units (less than 100 MMBTU/hr)	\$10,000	(NOx) 42.0 - 48.0	6/97 6/98	A A	B B	B B	1993 1994
D5	CONTROL OF EMISSIONS FROM CEMENT PLANT KILNS (a) Adopt NOx controls similar to existing SCAQMD Rule 1112 (b) Adopt NOx controls requiring flue-gas treatment	\$1000 \$2000	(NOx) 2.7 - 3.3	1981 2000 +	A D	B B	B B	IMPLEMENTED 2000 +
D6	CONTROL OF EMISS. FROM GLASS MANUFACTURING PLANT MELTING FURNACES (a) Adopt NOx controls similar to existing SCAQMD Rule 1117	\$4000	(NOx) 2.3 - 2.8	1/97	A	A	B	1993
D7	CONTROL OF EMISSIONS FROM RESIDENTIAL WATER HEATING (a) Adopt NOx standards for new residential and commercial water heaters	\$1600	(NOx) 1.3 - 1.6	1/93	A	C	B	1992
D9	CONTROL OF EMISSIONS FROM RESIDENTIAL WOOD COMBUSTION (a) Adopt control measures recommended in ARB's SCM	unknown	unknown	1/93	A	C	C	1992
E.	OTHER INDUSTRIAL/COMMERCIAL PROCESSES							
E1	CONTROL OF EMISSIONS FROM RUBBER PRODUCTS MANUFACTURING (a) Require abatement of RHC emissions from rubber product manufacturing operations	\$6000	unknown	7/99	C	A	B	98 - 2000
E3	CONTROL OF EMISSIONS FROM COMMERCIAL CHARBROILING (a) Set RHC emission limits for commercial charbroilers	\$25,000	1.4	2000 +	B	B	A	2000 +
F.	OTHER STATIONARY SOURCE CONTROL MEASURES							
F1	IMPROVED NEW SOURCE REVIEW RULE (ADOPTED) (a) Adopt an NSR Rule that requires mitigation for all new/modified sources	unknown	unknown	7/91	B	B	A	1991
F3	PROMOTION OF ENERGY EFFICIENCY (a) Establish a goal of increasing energy efficiency	unknown	unknown	1/96	A	A	D	95 - 97
F4	ENHANCED ENFORCEMENT OF EXISTING DISTRICT REGULATIONS (a) Implement a program to increase compliance with District regulations	unknown	unknown	7/95	A	A	C	1994
G.	INTERMITTENT CONTROL MEASURES							

Table 2 (con't)

1991 CLEAN AIR PLAN STATIONARY SOURCE CONTROL MEASURES (con't)

ID#	TITLE OF CONTROL MEASURE	Cost Effectiveness \$/ton-reduced	Total ER Potential tons/day	Rate of Reduction imp. date	Technolog. Feasibility A thru D	Public Acceptance A thru D	Enforce. A thru D	Proposed Adoption
G1	CITIZEN POSTPONEMENT OF DISCRETIONARY ACTIVITIES (a) Encourage postponement of certain activities during forecast ozone excess days	no cost	6.5-13.0 (R) .50-1.0 (N)	9/91	B	C	D	1991
G2	INDUSTRIAL POSTPONEMENT OF ACTIVITIES DURING FORECAST OZONE EXCESS DAYS (a) Implement a program directed at postponement of certain industrial activities during forecast ozone excess days (1) Voluntary (2) Mandatory	unknown unknown	3.7 - 4.1 (R) .10 - .12 (N)	7/92 7/95	A B	A B	C B	1991 1994
BAAQMD PROGRAMS AFFECTING MOTOR VEHICLES								
H1	SMOKING VEHICLE PROGRAM (a) Implement a citizen complaint program for smoking vehicles	unknown	.07 (RHC)	1/93 .18 (NOx)	A	A	D	1992
H3	REQUIREMENT FOR CLEAN FUEL VEHICLES IN FLEETS (a) Require fleet owners to use clean fuel vehicles	unknown	.37 (RHC)	7/96 .13 (NOx)	A	A	C	95 - 97

NOTES

Cost-Effectiveness is the estimated average value for all sources affected by the control measure.

Total Emission Reduction (ER) Potential is the summer day emission reductions (of RHC, unless otherwise specified) projected for the entire control measure (i.e. all control options) for the year 1997, assuming the measure is fully implemented in the absence of other competing control measures not currently adopted. In many cases, ranges of emission reductions are provided to address the uncertainty that exists in the estimates made.

Rate of Reduction is the estimated date that the control measure will be fully implemented. An implementation date of "2000 +" means the control measure is not anticipated to be implemented until after the year 2000. It should be noted that as control measures go through the rulemaking process more detailed information will be developed regarding feasible implementation dates.

Technological Feasibility, Public Acceptability, and Enforceability were graded on a scale of A through D, with an A being the highest rating and a D being the lowest.

Proposed Adoption indicates the date in which the control measure is expected to be adopted. For near-term control measures, a specific year is listed; for longer-term measures, for which specific adoption dates are more uncertain, the anticipated planning period in which adoption is expected is specified.

- 1) Substantially reduce the rate of increase in vehicle trips and vehicle miles traveled (VMT).
- 2) Achieve an average vehicle ridership (AVR) of at least 1.5 persons per passenger vehicle (including public transit) during weekday commute hours by 1999.
- 3) Achieve no net increase in vehicle emissions after 1997.

In addition to developing "reasonably available" transportation control measures, air districts are also required to develop an indirect source control program to reduce emissions from sources that generate or attract motor vehicle trips.

Rationale for TCMs

The average light duty motor vehicle has become much cleaner over the past 20 years, due to stronger tailpipe controls, cleaner fuels, and the biennial Inspection and Maintenance program. With these controls, today's cars are about 90% cleaner than their counterparts of twenty years ago. Despite these measures, the rapid increase in motor vehicle use has attenuated progress toward attainment of clean air standards. Over the past twenty years, vehicle miles traveled (VMT) have increased nearly three times faster than population. While state population increased by 2% per year during the 1980's, VMT increased by 5% per year. During the 1980s, Bay Area VMT growth rates averaged 3.5% per year and population growth rates averaged 1.6% per year. Bay Area growth rates projected for the future are much lower, but the trends are still important.

Recent actions by the California Air Resources Board (see Section 8) will result in even cleaner new cars over the next decade. These measures, coupled with natural turnover in the vehicle fleet, will greatly reduce motor vehicle emissions (see Table 1). Along with improved air quality, TCMs will provide other important benefits, including reduced traffic congestion and reduced fuel consumption. Nonetheless, the Bay Area is still expected to fall short of attainment of the state ozone standard. Therefore, in addition to stationary source control measures, transportation control measures are proposed.

Overview of TCM Plan

The TCM plan for the '91 CAP is an integrated set of 23 measures designed to meet the specific conditions and needs of the Bay Area. These measures will be implemented in two phases, although certain TCMs span both phases. Phase 1 includes "reasonably available" measures that can be adopted and/or initiated in the near term, prior to the triennial CAP update. Phase 2 includes measures which are not expected to be initiated until after the CAP update. However, Bay Area agencies will begin immediately to seek the additional funding and/or legislative authority required for most of the Phase 2 measures. Figure 4 portrays the phasing of the TCM plan.

The TCM plan is best understood as a set of complementary measures that fall into several functional categories: mobility improvements, trip reduction measures, user incentives, revenue measures, pricing measures, traffic operations, land use/transportation linkages, intermittent measures, and support measures. Brief descriptions of the TCMs are provided in Table 3. Expanded descriptions are contained in Appendix F.

Implementation Issues

Successful implementation of the TCM plan will require cooperation among many public agencies, the private sector, and the citizenry of the Bay Area. Agencies responsible for implementing the transportation control measures include MTC, ABAG, Caltrans, transit operators, cities and counties, ridesharing agencies and congestion management agencies. Table 3 identifies implementing agencies and schedules for each of the TCMs.

Recognizing that many agencies are already taking actions to help improve regional air quality, the District will strive to build on these efforts in implementing transportation control measures. The District will delegate implementation of employer-based trip reduction (TCM 2) and indirect source control programs (TCM 16) to local agencies that meet the delegation criteria required by the CCAA.

While public agencies are responsible for developing and operating the region's transportation system, the general public and the private sector are the ultimate users of the system. These groups will play a critical role in determining the success of the plan, both in their willingness to support

Figure 4
TCM PLAN PHASING

Phase 1 - Reasonably Available

Phase 2 - Need Additional Funding and/or Legislative Authority

Employer based Trip Reduction

- Employer assistance programs (TCM 1)
- Trip Reduction Rule (TCM 2)

**Indirect Source Review
(TCM 16)**

- New development
- Existing development

Mobility Improvements

- Improve areawide transit (TCM 3)
- Rail extensions (TCM 4)
- Improve access to rail (TCM 5)
- Intercity rail service (TCM 6)
- Improve ferry service (TCM 7)
- HOV (carpool) lanes (TCM 8)
- Bicycle improvements (TCM 9)
- Youth transportation (TCM 10)
- Transit use incentives (TCM 13)

Traffic Operations System

- Freeway incident management (TCM 11)

Intermittent Measures

- Voluntary No Drive Days(TCM 23)

Revenue Measures (TCM 21)

- Bridge toll increase
- Vehicle registration fee increase

Implementation Support

- Public education (TCM 17)
- Develop legislative package for pricing measures (TCM 22)
- Demonstration projects (TCM 20)
- General plan s- air quality elements (TCM 19)
- High density zones at transit stations (TCM 18)

Mobility Improvements

- Improve areawide transit (TCM 3)
- Expand new rail starts (TCM 4)
- Improve access to rail system (TCM 5)
- Intercity rail service (TCM 6)
- Improve ferry service (TCM 7)
- HOV (carpool) lanes (TCM 8)
- Bicycle improvements (TCM 9)
- Youth transportation (TCM 10)

Traffic Operations System

- Freeway incident management (TCM 11)
- Arterial traffic management (TCM 12)

User Incentives

- Transit use incentives (TCM 13)
- Vanpool liability insurance (TCM 14)
- Carpool subsidies and incentives (TCM 15)

Pricing Measures (TCM 22)

- Smog fee
- Gas tax increase
- Congestion pricing
- Parking management
- Work parking charges
- Non-work parking charges

Revenue Measures

- Gas tax increase or equivalent revenues (TCM 21)

Implementation Support

- Expand public education (TCM 17)
- Demonstration projects (TCM 20)

TABLE 3
TRANSPORTATION CONTROL MEASURES SUMMARIES⁽¹⁾

ID#	CONTROL MEASURE DESCRIPTION	IMPLEMENTING AGENCIES	SCHEDULE
TCM #1	EXPAND EMPLOYER ASSISTANCE PROGRAMS 0 Provide assistance to regional and local ridesharing organizations 0 Provide assistance to employers, cities, counties Train employee transportation coordinators Train city/county transportation demand management coordinators Transportation management association start-up assistance Telecommuting program, employee commute survey, vanpool program assistance	MTC, Caltrans, cities, counties, CMAs, BAAQMD RIDES, Solano Rideshare, Commuter Net work, CMAs, MTC, BAAQMD	Ongoing, expansion with additional funds Ongoing, expansion with additional funds
TCM #2	ADOPT EMPLOYER-BASED TRIP REDUCTION RULE 0 Develop "model" trip reduction ordinance for distribution to cities and counties (Fed TCM 28) 0 Adopt regional employer-based trip reduction rule	MTC BAAQMD (delegation to cities and counties)	Completed & distributed 1991 Adopt rule 1992; implement 1993
TCM #3	IMPROVE AREAWIDE TRANSIT SERVICE 0 Increase local bus service by 33% 0 Continue post-earthquake increase in BART service (Fed TCM 17) 0 Rail service expansion plans based upon rail operators' short range transit plans 0 Upgrade CalTrain service (Fed TCM 19) Increase from 54 to 66 trains daily Extend service 2.8 miles south from San Jose Cahill Station Extend service to Gilroy 0 Convert transit buses to clean fuel vehicles	MTC, transit operators BART MTC, rail operators Peninsula Joint Powers Board, CalTrans Transit operators	Depends on funding Ongoing since 1989 earthquake 1991-1999 1993 1992 1993 Depends on funding
TCM #4	EXPEDITE & EXPAND REGIONAL RAIL AGREEMENT Based on New Rail Starts Program - MTC Resolution 1876 0 Extend BART to: Colma (Fed TCM 16) Dublin West Pittsburg Warm Springs SF International Airport 0 Extend Tasman Light Rail (12 miles, 19 stations) 0 Extend Caltrain to downtown terminus in San Francisco	BART Santa Clara County Transit Peninsula Joint Powers Board	Service in 1996 Service in 1995 Service in 1997 Service in 1997 Service in 2001 Service in 1996 Service in 1995

TABLE 3 (con't)
TRANSPORTATION CONTROL MEASURES SUMMARIES⁽¹⁾ (continued)

ID#	CONTROL MEASURE DESCRIPTION	IMPLEMENTING AGENCIES	SCHEDULE
TCM #5	IMPROVE ACCESS TO RAIL & FERRIES 0 Feeder bus service to rail & ferries 0 Improve bicycle access and facilities 0 Private shuttles from transit station to employment centers 0 Increase parking at transit stations 0 Encourage BART and Caltrain to provide preferential parking for electric vehicles	Transit operators, MTC MTC, transit operators Employers, TMAs, Caltrain, BART, RIDES Transit operators MTC, BAAQMD	Limited implementation ongoing, expanded implementation depends on funding
TCM #6	IMPROVE INTERCITY RAIL 0 Implement new intercity rail service in Auburn - Sacramento - Oakland - San Jose corridor	Caltrans, Amtrak, MTC, Southern Pacific	Initial service early 1992 (3 roundtrips per day) Increased service in Phase 2
TCM #7	IMPROVE FERRY SERVICE 0 Retain post-earthquake service - Oakland/Alameda to San Francisco (FED TCM 17) 0 Add second ferry to Vallejo/San Francisco run; make improvements to Vallejo Terminal 0 Potential new service from Harbor Bay Isle (Alameda) to San Francisco 0 Potential new service from Port Sonoma to San Francisco 0 Study new service from Berkeley and Richmond to San Francisco and between SF and Oakland airports	City of Alameda, Port of Oakland, MTC City of Vallejo Private operator, PUC Private operator, PUC MTC	Ongoing since 1989 Start-up 1994-1995 1992 1993 Phase 2
TCM #8	CONSTRUCT CARPOOL/EXPRESS BUS LANES ON FREEWAYS 0 Based on "2005 HOV Lane Master Plan" which would expand existing 80 lane miles to 480 upon completion 0 Approximately 220 lane miles are fully funded in current TIP 0 Implement HOV support facilities - park & ride lots, special HOV ramps, express bus service	Caltrans, MTC Caltrans, MTC Caltrans, MTC, transit operators	Plan will be implemented over next 15 years See 1992-96 TIP Phases 1 and 2
TCM #9	IMPROVE BICYCLE ACCESS & FACILITIES 0 Establish Bicycle Advisory Committees, comprehensive bicycle plans 0 Encourage transit operators to accommodate bicycles on transit vehicles 0 Encourage Caltrans to accommodate bicycles on all bridges 0 Encourage employers & developers to provide bicycle access & facilities 0 Improve & expand bicycle lane system	Cities, counties, MTC MTC, transit operators, BAAQMD Caltrans, MTC, BAAQMD BAAQMD, cities, counties Cities, counties, Caltrans	1991 - 1992 Ongoing Depends on funds Ongoing & TCM 16 Depends on funds
TCM #10	YOUTH TRANSPORTATION 0 Convert school buses to clean-fuel vehicles 0 Allocate funds to transit operators for provision of youth discount tickets 0 Encourage carpooling among students with access to cars	School districts MTC, transit operators RIDES, school districts	Depends on funding Depends on funding Phase 2

TABLE 3 (con't)

TRANSPORTATION CONTROL MEASURES SUMMARIES⁽¹⁾ (continued)

ID#	CONTROL MEASURE DESCRIPTION	IMPLEMENTING AGENCIES	SCHEDULE
TCM #11	Install Freeway Traffic Operations (TOS) 0 Implement traffic operations system to reduce freeway congestion. TOS includes traffic surveillance, traffic advisory signs, incident management, ramp metering. Routes that feed Bay Bridge (Fed TCM 26) Full TOS implementation on 216 miles 0 Develop automated electronic toll collection facilities	Caltrans Caltrans	1992 Phase 2 Depends on funding
TCM #12	IMPROVE ARTERIAL TRAFFIC MANAGEMENT 0 Continue on-going local signal timing programs (Federal TCM 25) 0 Expand signal timing programs to additional cities. (Federal TCM 24) 0 Study signal pre-emption for buses on arterials with high volume of bus traffic 0 Develop SMART streets to serve as reliever routes for congested freeways	Caltrans, cities MTC, Caltrans, cities, CMAs Cities, transit operators, CMAs Caltrans, MTC, cities	Ongoing 1992 Phase 1 Phase 2
TCM #13	Transit Use Incentives 0 Improve coordination between transit operators - routes, schedules, transfers, fares (Federal TCM 21) 0 Expand marketing & distribution of transit passes and tickets: Expand Regional Transit Connection (RTC) ticket distribution through employers (Federal TCM 22) Implement "Commuter Check" program for employers to subsidize employee transit passes Set up local transportation stores to sell transit passes, distribute information 0 Promote free feeder bus service to BART, Caltrain, ferries 0 Selective fare reductions: reduce off-peak fares, develop special fares for family and tourist travel, weekend discounts, etc.	MTC, transit operators MTC, transit operators MTC, RIDES, transit agencies, Commuter Check Corp, employers MTC, cities, counties MTC, BAAQMD MTC, transit operators	Ongoing - MTC has developed guidelines for fare & schedule coordination Ongoing Began 1991 Depends on funding See TCM 5 Depends on funding
TCM #14	Vanpool Liability Insurance 0 Assess the vanpool market; consider need for publicly funded VP insurance program. Implementation would require additional funding	MTC, RIDES	RIDES' study in FY 1991-1992; implementation to follow, based upon funding.

policies to implement the plan and in their willingness to reduce motor vehicle trips in favor of enriched transportation alternatives.

TCM Emission Reductions

When fully implemented, TCMs are estimated to reduce on-road emissions of reactive hydrocarbons by 30%, carbon monoxide by 32%, and nitrogen oxides by 25%, compared to the projected baseline for 1997. Emission reductions (tons/day) for Phases 1 and 2 are as follows:

	RHC	NOx	CO
Phase 1	10	16	140
Phase 2	36	46	540
Combined Effect	41	57	630

Note that Phase 1 and Phase 2 are not additive, due to interactions among the measures. Reductions in emissions, vehicle trips and VMT for each TCM are shown in Table 4. The carbon monoxide reduction estimates are calculated before consideration of oxygenated fuel benefits.

Meeting CCAA Performance Standards

In addition to contributing toward the achievement of emission reduction requirements, TCMs are also required to achieve the transportation performance standards in the California Clean Air Act. New state requirements for cleaner fuels and improved motor vehicle emission control systems will suffice in meeting the goal of no net increase from mobile source emissions. However, the two remaining requirements pose a major challenge.

The Air Resources Board interprets the requirement for a substantial reduction in the rate of increase in vehicle trips and VMT to mean that they should increase no faster than the rate of population growth in the region. As mentioned earlier, VMT has increased at nearly three times the rate of population growth over the past twenty years. ABAG and MTC predict that demographic trends will dampen VMT and trip growth in the near future, but growth in VMT and trips will still outpace population growth. The TCM plan, when fully implemented, is expected to reduce vehicle trips by 23% and VMT by 22%, compared to the

projected 1997 baseline. These reductions, when combined with demographic trends, are expected to achieve the performance target for reducing growth in vehicle trips and VMT.

The third CCAA transportation requirement calls for the region to achieve by 1999 an average of 1.5 persons per vehicle, including transit riders, during the commute period. MTC data shows that average vehicle ridership (AVR) has been declining in the region, from 1.48 during the morning commute period in 1980 to 1.43 in 1987. We will have to reverse this downward trend in order to achieve the 1.5 target mandated by the CCAA.

Modeling results indicate that achieving the vehicle ridership goal is dependent upon implementation of pricing measures. MTC travel forecasts for 1997 indicate that substantial pricing measures would increase AVR from 1.43 to 1.54. Therefore, it is critical to build the political and public support needed to implement the market-based pricing measures, both to achieve emission reductions and to assure compliance with the CCAA transportation performance standards.

Monitoring

Monitoring is necessary to gauge TCM implementation progress, to determine effectiveness of TCMs in reducing motor vehicle emissions, and to measure progress toward the CCAA transportation performance standards. Monitoring results will be used to refine TCMs during the triennial clean air plan update process.

The Air District and MTC will develop a specific monitoring plan by January 31, 1992. If sufficient funds are identified, the monitoring plan is expected to be based on a detailed regional travel survey to determine trends in vehicle trips, VMT and vehicle ridership (see also Appendix B: Transportation Performance Standards Monitoring).

Emission Reductions

Table 5 shows the emission reductions estimated for the measures in this plan based on present source inventory data and methodologies. These are planning estimates; actual future year emission reductions will depend upon refined inventory data, actual requirements of rules as adopted, and degree of compliance by the regulated community.

Table 4
REDUCTION IN EMISSIONS AND VEHICLE TRAVEL FOR TCMs ⁽¹⁾

		Percent Reduction			Emission Reduction (Tons/Day)			Percent Reduction	
		RHX	NOx	CO	RHX	NOx	CO	Vehicle Trips	VMT
TCM 1	Expanded Employer Assistance Programs	0.18	0.18	0.17	0.24	0.40	3.3	0.14	0.20
TCM 2	Employer-based Trip Reduction Rule	3.6	3.7	3.8	4.9	8.2	73.	4.1	3.3
TCM 3	Improve Transit Service	1.5	1.4	1.3	2.0	3.0	26.	1.3	1.5
TCM 4	Expand Regional Rail System	0.86	0.76	0.86	1.2	1.7	17.	0.85	0.77
TCM 5	Improve Access to Rail & Ferries	0.32	0.32	0.28	0.44	0.71	5.4	0.28	0.32
TCM 6	Improve Intercity Rail	0.09	0.09	0.07	0.12	0.20	1.4	0.07	0.09
TCM 7	Improve Ferry Service	0.05	0.04	0.03	0.07	0.09	0.58	0.03	0.05
TCM 8	Construct HOV Lanes	0.64	0.58	0.62	0.88	1.3	12.	0.57	0.68
TCM 9	Improve Bicycle Access/Facilities	0.03	0.03	0.04	0.04	0.07	0.77	0.04	0.03
TCM 10	Youth/Student Transportation	0.14	0.14	0.16	0.19	0.31	3.1	0.17	0.11
TCM 11	Install Traffic Operation System	1.8	1.5	2.5	2.5	3.2	47.5	+0.10	+0.15
TCM 12	Improve Arterial Traffic Flow	0.43	0.52	0.63	0.59	1.2	12.2	+0.03	+0.02
TCM 13	Reduce Transit Fares	0.32	0.32	0.31	0.44	0.71	6.	0.33	0.28
TCM 14	Vanpool Liability Insurance	0.02	0.02	0.01	0.03	0.04	0.19	0.01	0.02
TCM 15	Provide Carpool Incentives	0.20	0.30	0.20	0.27	0.67	3.9	0.20	0.30
TCM 16	Indirect Source Control Program	0.70	0.70	0.70	0.96	1.6	13.6	0.70	0.70
TCM 17	Conduct Public Education ⁽²⁾	-	-	-	-	-	-	-	-
TCM 18	High Density Near Transit	0.05	0.05	0.05	0.07	0.11	0.97	0.05	0.05
TCM 19	Air Quality Elements for General Plans ⁽²⁾	-	-	-	-	-	-	-	-
TCM 20	Conduct Demonstration Projects ⁽²⁾	-	-	-	-	-	-	-	-
TCM 21	Implement Revenue Measures	1.8	1.9	1.8	2.5	4.2	34.3	1.8	1.9

Table 4 (con't)

REDUCTION IN EMISSIONS AND VEHICLE TRAVEL FOR TCMs (continued)

		Percent Reduction			Emission Reduction (Tons/Day)			Percent Reduction	
		RHX	NOx	CO	RHX	NOx	CO	Vehicle Trips	VMT
TCM 22	Market-based Measures ^(3,4)								
TCM 22a	Smog-based Vehicle Registration Fee	4.5	1.2	4.5	6.2	2.7	87	0.1	0.2
TCM 22b	Regionwide Congestion Pricing	5.5	2.9	7.5	7.5	6.4	145	2.2	1.8
TCM 22c	Regionwide Non-work Parking Charge	4.6	4.5	5.1	6.3	10.	99	5.4	4.2
TCM 22d	Gas Tax Increase of \$2.00 per Gallon	7.8	7.8	7.6	10.7	17.3	147	7.6	8.1
TCM 22e	Worksite Parking Charges ⁽⁵⁾	-	-	-	-	-	-	-	-
TCM 23	Ozone Excess "No Drive Days" (Voluntary) ⁽⁶⁾	<u>5.0</u>	<u>5.0</u>	<u>5.0</u>	<u>6.8</u>	<u>11.1</u>	<u>97</u>	<u>5.0</u>	<u>5.0</u>
TOTAL ⁽⁷⁾		30	26	32	41	57	630	23	22

NOTES:

- ⁽¹⁾ Emission reduction estimates are based on on-road vehicle emissions inventory for 1997. Projected tons/day are: 137 tons/day for RHC, 222 tons/day for NOx, 1939 tons/day for CO
- ⁽²⁾ No emission reductions are claimed for TCM 17, 19, or 20. These measures are classified as support measures.
- ⁽³⁾ The emission reduction estimates for TCM 22 are based solely on the disincentive effect of higher driving costs. They do not include additional emission reductions that would be achieved by using revenues generated by pricing measures to fund improved transportation alternatives. See description of TCM 22 in Appendix F for total emission reductions for TCM 22.
- ⁽⁴⁾ Emission reduction in tons/day for TCM 22 differ from Table 2c in June addendum. Figures in June addendum were based on Year 2000 Emission Inventory; present table is based on Year 1997 Inventory.
- ⁽⁵⁾ No additional reductions are claimed for this measure because the reductions for TCM 2 - Employer-based Trip Reduction assumed a program based on performance standards equivalent to \$3.00/day worksite parking charge.
- ⁽⁶⁾ TCM 23 is a voluntary measure. Emission reductions are not enforceable, nor easily quantified. Therefore, the TCM 23 emission reductions are not included in the total for the TCM plan.
- ⁽⁷⁾ TCM reduction total is less than the sum of reductions for individual TCMs. This is due to the fact that as each control measure reduces emissions, the size of the inventory decreases.

Table 6 shows the expected rates of reduction in emissions, by pollutant, in percent per year.

Need for New Legislation

Some of the transportation measures proposed in this Plan will require new legislative authorities for successful implementation. Regional and local agencies will need to develop a coordinated legislative program for:

- TCM 21 - Revenue measures to allow full implementation of other TCMs
- TCM 22 - Authority for market-based TCMs
- TCM 16 - Effective linkage and coordination of county congestion management agency work with indirect source control programs in this Plan

The affected agencies and other interested groups will work expeditiously to develop needed legislation, seek sponsors, and promote passage of laws to enable implementation of all of the proposed TCMs.

TABLE 5
ESTIMATED EMISSION REDUCTIONS (TONS PER DAY) FROM PROPOSED MEASURES

	1994 ('91 CAP)			1997			2000		
	RHC	NOx	CO	RHC	NOx	CO	RHC	NOx	CO
Stationary Source Measures	9	0.4	--	27	57	--	33	76	--
Intermittent (Voluntary) Measures *	(6	0.5	--)	(6	0.5	--)	(6	0.5	--)
BAAQMD Mobile Source Measures	0.1	0.2	1	0.4	0.3	4	0.4	0.3	4
Transportation Control Measures	10	16	145	41	57	626	33	52	546
Intermittent (Voluntary) TCMs *	(8	12	112)	(7	11	97)	(6	10	85)
Oxygenated Fuels (winter -- federal) **	--	--	265	--	--	228	--	--	197
COMBINED EFFECTS ***	19	17	394	68	114	783	66	128	681

* Voluntary measures are not added into totals for Combined Effects because voluntary curtailment of activities is difficult to verify or monitor. Estimate for voluntary TCMs ("No-drive Days") assumes 5% reduction in travel.

** Assumes oxygen content in gasoline adequate to reduce CO emissions by 12%.

*** In Combined Effects for CO, TCM effectiveness is discounted by 12% because of oxygenated fuel reductions. Voluntary measures are not credited.

TABLE 6

RATE OF EMISSION REDUCTIONS WITH PROPOSED MEASURES

	1987			1994			1997			2000		
	(BASE YEAR)			(WITH '91 CAP)								
	RHC	NO _x	CO	RHC	NO _x	CO	RHC	NO _x	CO	RHC	NO _x	CO
Total Emissions (tons per day) *	677	662	3830	488	540	2766	413	437	2120	394	415	2009
Annual Reduction Rate (percent) **	not applicable			4.0	2.6	4.0	3.8	3.4	4.5	3.1	2.8	3.7
Cumulative Reduction Rate (percent)	not applicable			28	18	28	38	34	45	41	37	48

* Total anthropogenic (man-made) emissions in the Bay Area.

** Percent per year, calculated from the 1987 base year.

COST-EFFECTIVENESS ESTIMATES

Section 40922 of the CCAA requires an assessment of the cost-effectiveness of proposed control measures and a ranking of the measures. Section 40913(b) requires a determination by the District Board that the plan is a cost-effective strategy to achieve attainment of state standards by the earliest practicable date.

Cost-effectiveness can be estimated with confidence for some measures when the source characteristics, control technology, and economic factors are well known. Lacking any of these, the estimates are less certain. Best available estimates are provided in Table 7. In some cases, where uncertainties are great, the costs are listed as "unknown."

Transportation control measures are especially problematic for cost-effectiveness analysis for the following reasons:

- The effectiveness of TCMs depends in part upon human behavior and choices that are difficult to predict or measure.
- The costs may be large, especially if large capital investments and infrastructure improvements are involved.
- TCMs are often intended to meet several different societal goals, including congestion relief, mobility needs, and public safety requirements. Thus, it is difficult to assign a cost to the air pollution aspects alone.
- The methodology and analytical tools for TCMs are less developed than those for stationary sources.
- TCMs reduce congestion and thereby reduce travel time. There are differing opinions about the validity of reducing gross TCM costs by the value of the time savings to travelers and vehicles.
- Recognizing these factors, and consistent with ARB guidance, we list and rank TCM cost-effectiveness separately from stationary source measures.

Benefits and Costs of the Plan

A Socioeconomic Report has been prepared for the CAP to identify the important economic impacts of the measures on the groups

affected. The information available at this time is not adequate for complete quantification of all the benefits or all the costs. The major benefits of the CAP are health benefits, which are difficult to quantify. These include decreased health care costs, increased worker productivity, and improved quality of life.

Although the Socioeconomic Report is not a complete cost-benefit analysis, it provides useful information on the impacts of the '91 CAP on employment, business and industry, households and local government. Major findings are:

- The CAP will result in a net increase in employment in the region. More specifically, while the increased business costs of stationary source controls will lead to a loss of 2,160 jobs, about 1,080 jobs are expected to be generated in industries that provide products and technology needed to comply with the control measures. Furthermore, transit-related jobs are expected to increase by 2,880 jobs. Finally, the transportation system improvements are expected to generate 25,000 construction jobs over the next ten years.
- The stationary source control measures will increase costs to business and industry in the region by \$292 - \$340 million, but will not significantly affect the regional economy. The electric and gas industry and the petroleum industry are the sectors that would be most affected by proposed stationary source control measures.
- TCMs, especially the more effective market-based measures, would impose substantial expenses on the public (\$3 billion) and on business (\$330 million). Much of this expense represents transfers within the regional economy, and the expenses would be partially offset by travel time savings of about \$160 million for business and \$1.6 billion for commuters. Adverse cost impacts of market-based measures will be greater if new fees are imposed before transportation alternatives are in place.

Table 7a
Measures Ranked by Cost-Effectiveness

Ranking Cost-Effectiveness of Stationary Source Measures	
Savings	A3(a) A5(a) A6(a) A11(c) A13(b) A14(c) B3 B4
No Costs	G1
\$1000/ton*	C3 C4(a) C5(a) D5(a)
\$1100/ton	A18
\$2000/ton	A1 A2 A3(b) A4 A5(b) A6(b) A7 A8 A9(b) A10(a) A11(a,b) A12 A13(c) B2 C2 D1(a) D5(b)
\$3000/ton	C5(b)
\$4000/ton	A16 B1 D6
\$4200/ton	B5
\$6,000/ton	A14(a,b) E1
\$9,300/ton	D1
\$10,000/ton	C1 C6 D4
\$12,000/ton	D2
\$14,000/ton	D3
\$19,000/ton	A9(a)
\$25,000/ton	E3
\$42,000/ton	B6
Unknown	A10(b) A13(a,d) A15 A17 A19 B7 C4(b) C7 D7 D9 F1 F3 F4 G2 H2 H3

* \$ per ton of RHC (or NO_x for "D" measures)

Table 7b
Ranking Cost-Effectiveness of Transportation Measures

Savings to \$25,000/ton RHC	TCM1
25,000 to 50,000/ton	TCM 12, 16, 18
50,000 to 100,000/ton	TCM 11
100,000 to 250,000/ton	TCM 2, 13
250,000 to 500,000/ton	TCM 4, 5, 8, 10, 14, 15
500,00 to 1,000,000/ton	TCM 3, 6, 7, 9
Unknown or not applicable	TCM 17, 19, 20, 21, 22, 23

The ranking above was based on "gross" TCM costs. "Net" costs, after consideration of travel time savings, are significantly lower. TCMs 1, 11, 12, 16 and 18 would result in a net savings, if time savings are valued at \$5 per person-hour. For more information on travel time savings, see the TCM descriptions in Appendix F.

TABLE 8

ANNUAL REGULATORY AGENDA

1991 -- REGULATORY AGENDA (REMAINING)

- A14 IMPROVED COATINGS AND INK MANUFACTURING RULE
 (b) Eliminate the small manufacturer exemption
 (c) Require reduced emissions from vat cleaning
- C2 IMPROVED PUMP AND COMPRESSOR SEALS AT REFINERIES AND CHEMICAL PLANTS RULE
 (b) Adopt a more stringent leak definition
- C3 IMPROVED VALVES AND FLANGES AT REFINERIES AND CHEMICAL PLANTS RULES
 (b) Improve inspection and maintenance requirements
 (c) Adopt a more stringent leak definition
- G1 CITIZEN POSTPONEMENT OF DISCRETIONARY ACTIVITIES
 (a) Implement a program to encourage postponement of certain activities during forecast ozone excess days
- G2 INDUSTRIAL POSTPONEMENT OF ACTIVITIES DURING FORECAST OZONE EXCESS DAYS
 (a) Implement a program directed at postponement of certain industrial activities during forecast ozone excess days. (1) Voluntary
- TCM 23 OZONE EXCESS 'NO DRIVE DAYS' (VOLUNTARY)
 (a) Implement a program to discourage vehicle use during forecast ozone excess days

1992 -- REGULATORY AGENDA

- A3 IMPROVED AEROSPACE COATINGS RULE
 (a) Set transfer efficiency standards
- A5 IMPROVED SURFACE COATING OF MISCELLANEOUS METAL PARTS AND PRODUCTS RULE
 (a) Set transfer efficiency standards
- A6 IMPROVED SURFACE COATING OF PLASTIC PARTS AND PRODUCTS RULE
 (a) Set transfer efficiency standards
- A11 FURTHER CONTROL OF EMISSIONS FROM ADHESIVES USE
 (a) Establish VOC-limits for adhesives
 (b) Set transfer efficiency standards
 (c) Set standards for cleanup operations
- B2 IMPROVED STORAGE OF ORGANIC LIQUIDS RULE
 (c) Require better tank seals/more frequent seal inspections
 (g) Require emissions to be controlled during tank cleaning
- D1 CONTROL OF EMISSIONS FROM NON-UTILITY RECIPROCATING ENGINES
 (a) Adopt NOx controls similar to existing SCAQMD Rule 1110.2
- D7 CONTROL OF EMISSIONS FROM RESIDENTIAL WATER HEATING
 (a) Adopt NOx standards for new residential water heaters
- D9 CONTROL OF EMISSIONS FROM RESIDENTIAL WOOD COMBUSTION
 (a) Adopt control measures recommended in ARB's SCM
- H1 SMOKING VEHICLE PROGRAM
 (a) Implement a citizen complaint program for smoking vehicles
- TCM 2 EMPLOYER-BASED TRIP REDUCTION RULE
- TCM 21 IMPLEMENT REVENUE MEASURES
 (a) Implement AB434-Vehicle registration fee subvention-if signed by the Governor

TABLE 8 (con't)
ANNUAL REGULATORY AGENDA (continued)

1993 -- REGULATORY AGENDA

- A13 IMPROVED GRAPHIC ARTS PRINTING OPERATIONS RULE
(a) Lower VOC-limits for fountain solutions
(b) Require automatic blanket wash for large presses
(c) Lower VOC-limits for inks
(d) Require enclosed doctor blades
- B3 IMPROVED ORGANIC CHEMICAL TERMINALS AND BULK PLANTS RULE
(a) Reduce emission standard for non-gasoline bulk terminals and plants
- B5 LIMITATIONS ON MARINE VESSEL TANK PURGING
(a) Require control of ballasting and housekeeping emissions
- C1 IMPROVED PRESSURE RELIEF VALVES AT REFINERIES AND CHEMICAL PLANTS RULE
(a) Require venting to abatement devices and/or rupture disks with tell-tale indicators
- D2 CONTROL OF EMISSIONS FROM STATIONARY GAS TURBINES
(a) Adopt NOx controls similar to existing SCAQMD Rule 1134
- D3 CONTROL OF EMISSIONS FROM ELECTRIC POWER GENERATING BOILERS
(a) Adopt NOx controls based on add-on flue gas controls
- D4 CONTROL OF EMISSIONS FROM BOILERS STEAM GENERATORS AND PROCESS HEATERS
(a) Adopt NOx controls similar to existing SCAQMD Rule 1146
(1) Large Units (100 MMBTU/hr or larger)
- D6 CONTROL OF EMISSIONS FROM GLASS MANUFACTURING PLANT MELTING FURNACES
(a) Adopt NOx controls similar to existing SCAQMD Rule 1117
- TCM 16 INDIRECT SOURCE CONTROL PROGRAM
(a) Adopt a program for the review of new indirect sources

1994 -- REGULATORY AGENDA

- D4 CONTROL OF EMISSIONS FROM BOILERS STEAM GENERATORS AND PROCESS HEATERS
(a) Adopt NOx controls similar to existing SCAQMD Rule 1146
(2) Smaller Units (less than 100 MMBTU/hr)
- A10 IMPROVED GENERAL SOLVENT AND SURFACE COATING RULE
(a) Establish VOC-limits for coatings
(b) Modify mass emission limits
- A12 ELIMINATION OF COATINGS RULES ALTERNATIVE EMISSION CONTROL PLANS
(a) Eliminate or modify AECP provisions in Reg. 8 Rules
- B1 CONTROL OF EMISSIONS FROM RAILCAR LOADING
(a) Require vapor recovery systems on railcar loading of organic liquids
- C6 FURTHER CONTROL OF EMISSIONS FROM WASTEWATER TREATMENT AT REFINERIES
(c) Require controls for hydrocarbon pond desludging
- F4 ENHANCED ENFORCEMENT OF EXISTING DISTRICT REGULATIONS
(a) Implement a program to increase compliance with District regulations
- G2 INDUSTRIAL POSTPONEMENT OF ACTIVITIES DURING FORECAST OZONE EXCESS DAYS
(a) Implement a program directed at postponement of certain industrial activities during forecast ozone excess days
(2) Mandatory
- TCM 16 INDIRECT SOURCE CONTROL PROGRAM
(b) Adopt a program for the review of existing indirect sources

STATE AND FEDERAL PROGRAMS THAT CONTRIBUTE TO '91 CAP GOALS

There are many programs, developed and implemented by other agencies at various levels of government, that contribute to improving air quality. Some of the major state and federal programs that reduce air pollution are listed below. The '91 CAP recognizes and supports these programs and depends on them for progress toward attaining air quality standards. The '91CAP also supports efforts to enhance such programs and to make them more effective.

State Programs

1. California Motor Vehicle Controls
 - New vehicle emission standards
 - Clean fuels standards (including RVP limits)
 - Warranty and durability requirements
 - Testing and recall programs
 - On-board diagnostics
 - Diesel bus and truck controls
 - Heavy duty vehicle smoke inspection
2. Off-road Motor Vehicles
 - Farm equipment greater than 175 hp
 - Construction equipment greater than 175 hp
 - Off-road motorcycles
3. Other Internal Combustion Engines
 - Lawn, garden, utility equipment
4. Locomotives
5. Marine Vessels
6. Consumer Products (household, automotive, cosmetic, etc.)
7. California Inspection & Maintenance ("Smog Check") Program
8. State Requirement for County Congestion Management Programs

Federal Programs

1. Oxygenated Fuels in Winter to Reduce CO
2. Enhanced Inspection and Maintenance Programs
3. Off-road Vehicles less than 175 hp
4. Urban Bus Controls, (New and In Use)
5. Federal Conformity Requirements

The '91 CAP specifically recognizes, supports, and requests the following:

- Any state mobile source measure being carried out in Southern California should also be implemented in the Bay Area on the same schedule. For clean vehicle/clean fuel programs, the program scale (in terms of number of vehicles, amount of fuel, number of stations, etc.) should be proportional to population.
- The California Inspection and Maintenance (Smog Check) Program should be improved and enhanced to achieve maximum feasible emission reductions, equivalent to the most effective annual centralized programs in the United States or Canada.
- Oxygenated gasoline will be required in the Bay Area during winter months, consistent with the (federal) Clean Air Act Amendments of 1990 and EPA guidance, to reduce motor vehicle carbon monoxide emissions. Expected requirements will be 2.7% oxygen by weight during the months of October through January, starting in October 1992.

OTHER ISSUES

The '91 CAP is a plan to reduce ambient ozone and carbon monoxide, in accordance with state law; the '91 CAP is not intended to satisfy federal air quality planning requirements. Other air quality issues of concern to the BAAQMD and to the public are summarized in this section.

PM₁₀

There are both national and state ambient air quality standards for PM₁₀ -- particulate matter with an aerodynamic diameter equal to or less than 10 microns. Ten microns is the largest "inhalable" particulate capable of penetrating the bronchial tubes. The San Francisco Bay Area does not attain the state PM₁₀ ambient air quality standard. The state standard is very stringent and only one county within the state (Lake County) currently attains this standard.

The California Legislature, when it passed the Clean Air Act in 1988, recognized the relative intractability of the PM₁₀ problem and excluded it from the basic planning requirements of Section 40910.

The act did require the Air Resources Board to prepare a report to the Legislature regarding the prospect of achieving the state ambient air quality standard for PM₁₀. This report recommends a menu of actions, many of which are already in effect or are being evaluated. The report, however, does not recommend imposing a planning process, similar to that for ozone and carbon monoxide, for achievement of the standard within a certain period of time. The report states that "... the Board does not believe the state PM₁₀ standards can be attained everywhere in California, and at all times, in the foreseeable future."

The CAP does not address PM₁₀ attainment, although the control measures in the CAP will reduce PM₁₀. Vehicular traffic is the major source of PM₁₀ emissions through vehicle reentrainment of road dust and dirt. Therefore, CAP measures to reduce trips and VMT will reduce PM₁₀ as well. Oxides of nitrogen (NO_x) emissions from vehicular and stationary source fuel combustion are precursors to nitrates, which compose a significant portion of ambient PM₁₀. Thus, the mobile source, transportation, and stationary source (NO_x) control measures in the CAP will have a beneficial effect on reducing PM₁₀.

Toxic Air Contaminants

Toxic air contaminants are of concern because these substances are either known or suspected carcinogens or they are known or suspected to cause other non-carcinogenic chronic health effects. Major federal and state programs are in place to identify and control toxic air contaminants.

The BAAQMD Board has adopted a Toxic Air Contaminant Reduction Plan to reduce the health risk to Bay Area residents from toxic air contaminants. The explicit goal of the plan is to reduce the toxicity of emissions from sources subject to BAAQMD jurisdiction to less than 50% of the 1989 levels by 1995. Implementation of the plan will reduce the emissions of both carcinogens and non-carcinogens, and will encourage the use of source reduction to eliminate pollution before it is generated.

Global Warming

Global warming, or the "greenhouse effect," is an environmental concern that continues to be investigated and studied. At this time, there is not a strong scientific consensus regarding global warming; however, certain gaseous pollutants have been termed "greenhouse gases" because of their properties and their ability to contribute to global warming. Methane and carbon dioxide are thought to be the most important of these gases. Carbon dioxide is produced from the combustion of fossil fuels. The California Legislature and the U.S. Congress are considering various bills that address global warming. Generally, the bills either require special research studies or require specific measures to reduce the use of fossil fuels. Energy conservation is the most effective and cost-effective way to reduce fossil fuel use. TCMs and Measure F3 (Promotion of Energy Efficiency) contribute to the reduction of global warming.

Stratospheric Ozone

While ozone near the earth's surface is a harmful pollutant, ozone in the stratosphere, which is 10 to 25 miles above the earth's surface, provides a protective shield from the sun's damaging ultraviolet rays. There is a strong scientific consensus linking chlorofluorocarbons (CFCs) and other substances containing chlorine or bromine with observed

reductions in stratospheric ozone. Stratospheric ozone depletion is a global problem that requires a global solution. The worldwide production phase-out of stratospheric ozone depleting substances is viewed as the solution to the problem.

The Montreal Protocol, an international production phase-out agreement, is designed to implement this solution over an extended period of time with interim production reductions designed to ease the transition to safe alternatives. In the interim period, before the total production phase-out of ozone depleting substances can be realized, actions are being taken to minimize the release of these substances to the atmosphere. The 1990 amendments to the federal Clean Air Act codify and in some cases accelerate the production phase-out schedule and require EPA to promulgate national rules to minimize the release of ozone depleting substances to the atmosphere.

The CAP does not address ozone depleting substances because they are not precursors to ozone formation in the troposphere. However, the BAAQMD Board has adopted a stratospheric ozone policy that is designed to reduce and minimize the release of ozone depleting substances to the atmosphere. The policy requires the elimination of exemptions from control requirements for ozone depleting substances in BAAQMD rules and requires the development of specified CFC capture and recycling rules for specified operations. Control measures contained in the CAP will be consistent with this policy.

Federal Planning Requirements

Major amendments to the federal Clean Air Act (federal act) were signed into law on November 15, 1990. These amendments

prescribe new planning requirements and attainment deadlines for areas that do not attain National Ambient Air Quality Standards (NAAQS). The NAAQS for ozone and carbon monoxide are less stringent than the state ambient air quality standards for these pollutants.

The federal act prescribes planning and control requirements similar to those contained in the California Clean Air Act (CCAA). The prescribed control requirements for ozone and carbon monoxide nonattainment areas in the federal act are generally less stringent than those contained in the CCAA, except for the requirements for motor vehicle inspection and maintenance and for oxygenated motor vehicle fuels. The federal act requires an annual centralized motor vehicle inspection and maintenance program, or its equivalent, and requires the sale of oxygenated gasoline during the winter months, as defined by implementing regulations.

The federal act contains planning time frames and attainment deadlines that are significantly different from those contained in the CCAA. These time frames and deadlines also vary by pollutant. The federal act contains a classification system for ozone nonattainment areas that includes five different classifications with varying attainment deadlines, based upon ambient levels of ozone. The CCAA contains a classification system that includes three different classifications, with attainment deadlines based upon when an area is projected to attain the standard.

Efforts are underway to adjust the CCAA planning requirements, submittal dates, and classification system to more closely parallel and coincide with those contained in the federal act. These adjustments will require amendments to the CCAA.

APPENDIX A

DETERMINATION OF FEASIBLE MEASURES AND EXPEDITIOUS ADOPTION SCHEDULE

Areas that cannot achieve the 5% per year pollutant reduction target in the California Clean Air Act can comply with an alternative requirement of the act, Section 40914 (b) (2), which calls for adoption of every feasible measure on an expeditious schedule. However, neither "feasible" nor "expeditious" is defined in the act.

Feasible Measures

Three sources of information have been useful in developing a working definition of feasible. These are: (1) common usage, (2) CEQA definitions, and (3) ARB guidance.

In common usage, feasible means capable of being done or dealt with successfully; suitable, reasonable, likely. (Webster's Ninth New Collegiate Dictionary, Merriam-Webster, 1988.)

In state law and in the guidelines for the California Environmental Quality Act, feasible means

... capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

This definition is also expressed in BAAQMD Regulation 2, Rule 2, Section 232.

The ARB has provided guidance on the meaning of feasible through various documents, including:

- The California Clean Air Act Guidance Paper #1 (ARB, August 1989), which discusses requirements for areas that cannot meet the 5% reduction target: "Simply put, the nonattainment area has to show that every reasonable and necessary step is being taken to achieve state standards by the earliest practicable date."

- The California Clean Air Act Transportation Requirements Guidance (ARB, February 1990), which includes recommendations for reasonably available transportation control measures.
- A list of Feasible Measures for Stationary Sources (ARB, March 19, 1991), which includes recognition of administrative and scheduling constraints.
- An ARB letter commenting on the Draft '91 CAP (ARB, August 19, 1991), which includes the following statement:

We believe that the combination of measures in the CAP and existing rules include nearly all the measures the ARB has determined to be feasible. The only exceptions are measures for transferring aircraft fuel into storage tanks and for residential wood combustion.

The ARB has the responsibility to review all clean air plans and to either approve the plans or notify the appropriate district of any deficiencies (Sec. 41503). (In response to the ARB comment mentioned above, measure D9--Residential Wood Combustion--is now included in the Bay Area '91 CAP. Aircraft fuel transfers to storage tanks are already covered by BAAQMD Regulation 8, Rule 7.)

The information sources listed above are largely compatible in terms of providing a useful definition of feasible. They were combined into the working definition of feasible for this Plan, which is as follows:

Feasible measures are those measures which are: (1) reasonable and necessary for the San Francisco Bay Area; (2) capable of being implemented in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors; and (3) approved or approvable by the California Air Resources Board, based upon state law and ARB policies.

District staff will monitor and review regulations adopted in other California areas. They will also report periodically to the District's Board of Directors on measures adopted and implemented elsewhere and recommend for adoption those that would provide significant reductions of ozone precursors or carbon monoxide in the Bay Area.

Expeditious Adoption Schedule

The BAAQMD would like to immediately adopt and implement all new control programs to improve air quality and protect health as quickly as possible.

In practice, District staff and the District Board must address the measures sequentially and, for each measure, take the necessary technical, administrative, and legal steps for successful implementation. It takes from six to eighteen months (and six to eighteen person-months of staff effort) to adopt a measure. The amount of time and resources required depends on the complexity, stringency, and cost of the proposed measure and upon the size, diversity, and sophistication of the regulated community. New programs for previously unregulated sources are particularly difficult.

During the past four years, the District has been able to adopt only four to five complex measures per year. Protracted adoption processes occurred for example with the marine loading, aerosol paints, and bakery rules.

ARB guidance suggests at least six plan measures per year as an expeditious schedule. **For the 91 CAP, the BAAQMD will attempt an adoption schedule of eight plan measures per year.** This effort will be in addition to other non-CAP regulatory programs related to toxics, particulate matter, and updates for existing rules.

The proposed schedule will require additional time from staff and Board members, because many of the measures will result in protracted rule development and adoption procedures. Examples are:

- Employer-based trip reduction
- Indirect source review
- Controls on utility boilers
- Woodburning
- Controls on refineries
- Energy efficiency

The transportation-related measures are expected to be much more difficult than any of the stationary source controls adopted in the past.

For each measure, District staff will have to gather and analyze data, identify the regulated community, prepare control proposals, prepare mailouts, hold workshops, communicate with all interested parties, refine analyses, prepare staff reports, develop delegation and/or enforcement procedures, and schedule public hearings.

If additional measures are added to the regulatory schedule, staff will have to delay some originally programmed measures or seek additional resources.

The BAAQMD's sequence of adoption for the stationary source measures in the '91 CAP was determined by three primary considerations:

- 1) Technical feasibility
- 2) Significant ozone precursor reductions on permitted sources
- 3) Cost-effectiveness within previously established ranges

The above considerations are prerequisites for District compliance with ARB's long-range transport mitigation regulations. These transport mitigation regulations require adoption by January 1, 1994 of measures requiring best available retrofit control technology (BARCT) on sources that account for at least 75% of the permitted stationary source inventory for ozone precursors.

Measure D9--Residential Wood Combustion--is included in the 1992 regulatory schedule. It is considered a feasible measure, according to ARB guidance, for the reduction of CO, RHC, and PM₁₀. The BAAQMD Board and public interest groups support an early adoption priority for this measure because of its multi-pollutant reduction potential, expected health benefits, and reduced nuisance value.

Scheduling of the transportation control measures was based primarily on availability under existing authorities and on agency resource constraints. Under existing laws, the BAAQMD can adopt and implement only two TCMs--TCM 2 (Employer-Based Trip Reduction) and TCM 16 (Indirect Source Review). Because they are new, controversial, and resource intensive, the TCM measures have been scheduled at the rate of one major program per year. The BAAQMD Board has directed staff to present the employer-based trip reduction rule for adoption by July 1992, with implementation to begin in 1993. Indirect source measures for new

developments are scheduled for adoption in 1993 and for existing indirect sources in 1994.

The early date for TCM 2 (Employer-Based Trip Reduction) is based on congestion management program requirements and schedules that will benefit from early, coordinated efforts.

Each of the above TCM programs will require increased staffing for rule development, as well as for the implementation, monitoring, and enforcement of the rules.

The other TCMs in the CAP, with the exception of TCMs 21 and 22, can be implemented without being adopted as BAAQMD rules, because they

rely on other agencies, programs, or processes independent of BAAQMD rules. Schedules and implementing agencies are shown in Table 3. Some measures depend upon additional funding for complete implementation.

TCMs 21 and 22 depend upon new legislative authority. Starting in 1992, the new legislation will be pursued expeditiously by the regional agencies and other interested parties.

Implementation of market-based measures will be scheduled as soon as the necessary authorities are obtained.

APPENDIX B

TRANSPORTATION PERFORMANCE STANDARDS MONITORING

This appendix addresses the monitoring system for determining progress toward the transportation performance standards of the California Clean Air Act (CCAA) in the Bay Area. In particular, this appendix specifically states the CCAA performance standards, provides estimates of average vehicle ridership (AVR), vehicle miles traveled (VMT) and vehicle trips in the Bay Area, describes the proposed monitoring approach for the Bay Area, and indicates the schedule for developing a specific monitoring program.

CCAA Transportation Performance Standards

The CCAA requires that areas with a "severe" classification meet three transportation performance standards:

- Substantially reduce the rate of increase in passenger vehicle trips and miles traveled.
- Achieve 1.5 average vehicle ridership during the commute period by 1999.
- Achieve no net increase in vehicle emissions after 1997.

The third performance standard, no net increase in vehicle emissions after 1997, will be met in the Bay Area as a result of tighter motor vehicle emission controls and natural turnover of the motor vehicle fleet. The emissions inventory for the Bay Area (Table 1 of the CAP) estimates on-road motor vehicle emissions in 1997 for reactive hydrocarbons, nitrogen oxides, and carbon monoxide to be 137 tons/day, 222 tons/day, and 1,940 tons/day, respectively. Estimates of motor vehicle emissions in 2000 for reactive hydrocarbons, nitrogen oxides, and carbon monoxide are 110 tons/day, 202 tons/day and 1,690 tons/day, respectively. Although not essential for meeting the no net increase performance standard, transportation control measures would further reduce the total emissions from motor vehicles in the Bay Area. Compliance with this performance standard beyond the year 2000 will be verified during each triennial CAP update.

The remainder of this appendix will address the first and second performance standards.

Estimates of AVR, VMT, and Trips

Average Vehicle Ridership (AVR)

The Metropolitan Transportation Commission (MTC) has estimated average vehicle ridership in the Bay Area using regional travel forecasts and the 1981 Bay Area Travel Survey (MTC Memorandum, Estimates of Regional Average Vehicle Ridership - Revised, June 13, 1991). Estimates for 1980, 1987, and 1997 are shown in the table below.

Bay Area Regional Average Vehicle Ridership (AVR) 1980 - 1997

Year	Daily AVR	Peak Period AVR	AM Peak AVR
1980	1.41	1.43	1.48
1987	1.38	1.39	1.43
1997	1.36	1.38	1.43
1997 + TCMs	1.41	1.45	1.54

Notes:

Peak Period includes the combined 6:00 to 9:00 a.m. and 3:00 to 6:00 p.m. periods. The AM Peak Period includes the 6:30 to 8:30 a.m. period only.

TCMs assumed in the 1997+ TCMs scenario include implementation of substantial market-based TCMs.

As indicated by the AVR estimates in the table above, commute period AVR is relatively high in the Bay Area. However, the trend has been downward as a result of shrinking household size, increasing household income, and increasing auto ownership. To reverse this trend and increase regional AVR to 1.5 will require a substantial effort. MTC analysis indicates that the 1.5 AVR performance standard can be met with implementation of substantial market-based TCMs (1997 + TCM scenario).

Vehicle Miles Traveled (VMT)

Statewide estimates indicate that, during the 1980s, VMT increased by 5% per year and population increased by 2% per year. Based on these estimates, VMT has grown at 2.5 times the rate of population growth. MTC estimates that the Bay Area VMT growth rate averaged 3.5% per year between 1980 and 1990. During this period, the Bay Area population growth rate averaged 1.6% per year. Based on these estimates, VMT grew at 2.2 times the rate of population growth. Travel projections in MTC's Final EIR for the 1991 Regional Transportation Plan estimate a 1.1% average annual growth in VMT between 1990 and 2010. The Bay Area population growth rate during this period is projected to be 0.8% per year. Based on these projections, VMT will grow at 1.4 times the rate of population growth, a significant decrease compared to the previous decade. MTC and others (e.g. Lave) are forecasting decreased travel, due to the leveling off of women entering the work force and the fact that most people of driving age already have cars.

Vehicle Trips

Travel projections in MTC's Final EIR for the 1991 Regional Transportation Plan estimate a 1.4% average annual growth in vehicle trips between 1990 and 2010. As indicated above, the Bay Area population growth rate during this period is projected to be 0.8% per year. Based on these projections, vehicle trips will grow at 1.75 times the population growth rate.

The Air Resources Board interprets the requirement for a substantial reduction in the rate of increase in vehicle trips and VMT to mean that they should increase no faster than the rate of population growth in the region. The TCM plan, when fully implemented, is expected to reduce vehicle trips by 23% and VMT by 22%, compared to the projected 1997 baseline. These reductions, when combined with demographic trends, are expected to achieve the performance target for reducing growth in vehicle trips and VMT.

Monitoring Approach

The proposed monitoring approach includes three elements:

- Administrative Record Tracking
- Traffic System Tracking
- Household Behavior Tracking

A multi-faceted approach for cross-checking and verification is required to establish accurate baselines and to provide independent methods of estimating AVR, VMT, and trips. The central component of this approach is the household behavior survey. The household survey will provide statistically valid measures of trips, VMT, and AVR.

Administrative record tracking would include data such as population, auto ownership, licensed drivers, gasoline prices, parking prices, transit fares, transit patronage, consumer price indices, fuel consumption, odometer readings, and household income.

Traffic System Tracking would include the continuation and expansion of the traffic counting programs of Caltrans and local public works departments. It could also include special surveys such as license plate origin-destination surveys and vehicle occupancy counts. Expansion of the Highway Performance Monitoring System (HPMS) to provide statistically valid regional-level information may also be a source of traffic data.

Household Behavior Tracking would include panel surveys or repeated cross-sectional surveys of households in the Bay Area. This effort would be an extension of MTC's 1990 household travel survey. The household travel survey is conducted every ten years to coincide with the Census and covers over 10,000 households. The panel surveys or repeated cross-sectional surveys would be conducted every two to three years to monitor progress, and would encompass a smaller sample size than the household travel survey. The household behavior tracking would provide statistically valid estimates of the following: vehicle trips (per household, per capita, and per vehicle); VMT (per household, per capita, and per vehicle); average vehicle ridership (by trip purpose and by time of day); and time of day travel by trip purpose.

This combined approach would likely carry a substantial cost. If sufficient funds cannot be identified, the scope of the program may need to be reduced. Other lower cost approaches could include telephone surveys, postcard surveys, and employee survey tracking in conjunction with TCM 2.

Schedule

The MTC and the BAAQMD will develop a specific Monitoring Program by January 31, 1992.

APPENDIX C

CALCULATION OF PERMITTED INVENTORY COVERAGE (FOR TRANSPORT MITIGATION)

Transport mitigation requirements specify that, by no later than January 1, 1994, the CAP provide for the adoption of rules that represent Best Available Retrofit Control Technology (BARCT) for source categories that collectively amount to at least 75% of the 1987 reactive hydrocarbon (RHC) and nitrogen oxides (NOx) inventories for permitted stationary sources. As demonstrated below, the regulatory agenda proposed in the CAP easily meets this requirement.

Although the ARB has provided general guidance regarding the assessment of BARCT, specific BARCT determinations have been issued for several source categories only. In the development of the CAP, the evaluation of BARCT, therefore, has largely been made by District staff based on available information.

Table C-1 contains the 1987 annual average emissions inventory for point sources located within the District. The point source inventory represents emissions from sources contained in the District's permit data base. The total emissions of RHC and NOx in the 1987 inventory are approximately 80 tons/day and 132 tons/day, respectively.

In recent years, District rulemaking efforts have centered on reducing RHC emissions. The District believes that most of the BAAQMD Regulation 8 rules already represent BARCT. In order to comply with the regulatory agenda proposed in the CAP, all of the Regulation 8 rules that do not already represent BARCT should be modified to meet BARCT by January 1, 1994.

Table C-2 contains a listing of RHC emissions from point sources regulated by the District's Regulation 8. The total 1987 RHC emissions from these sources is 69 tons/day, which represents about 86% of the point source inventory. Thus, if it is assumed that all existing District RHC rules either already represent BARCT or, as is proposed, are modified by January 1, 1994 to meet BARCT, the 75% transport mitigation requirement for RHCs will easily be met.

For NOx emissions, the District has proposed a comprehensive set of new retrofit control measures that will meet BARCT requirements. The

permitted stationary source measures that are scheduled for adoption by January 1, 1994 include:

- D1 Reciprocating Engines
- D2 Stationary Gas Turbines
- D3 Electric Power Generating Boilers
- D4 Large Boilers, Steam Generators, and Process Heaters
- D5 Cement Kilns
- D6 Glass Manufacturing Plant Melting Furnaces
- D7 Residential Water Heaters

The source categories affected by the proposed NOx measures are listed in Table C-1 in the broad category *Combustion - Stationary Sources, Fuels Combustion*. The control measures listed above would require BARCT for sources that account for NOx emissions in the categories *Cogeneration, Power Plants, Oil Refineries External Combustion, Reciprocating Engines and Turbines*. Sources which constitute 63% of the emissions in the category *Other External Combustion* would also have BARCT-level rules adopted by January 1, 1994. Collectively, the NOx emissions from affected source categories amount to about 110 tons per day, representing 83% of the 1987 point source inventory. Thus, the CAP's proposed regulatory agenda easily meets the 75% transport mitigation requirement for NOx.

TABLE C-1
BAY AREA AIR QUALITY MANAGEMENT DISTRICT
 Annual Average Inventory
PERMITTED POINT SOURCES

	Base Year 1987 Tons/Day	
	RHC	NOx
INDUSTRIAL / COMMERCIAL PROCESSES / FACILITIES		
Petroleum Refining Processes	27.5	10.7
Chemical Manufacturing Facilities	2.4	2.0
Other Industrial/Commercial Processes/Facilities	6.6	.4
PETROLEUM PRODUCT/SOLVENT EVAPORATION		
Petroleum Refinery Evaporation	7.2	.0
Fuels Distribution	3.8	.0
Other Organic Compound Evaporation	29.3	.0
COMBUSTION - STATIONARY SOURCES		
Fuel Combustion:		
Cogeneration	1.6	11.3
Power Plants	.2	32.1
Oil Refinery External Combustion	.5	38.4
Reciprocating Engines	.8	11.0
Turbines	.1	1.9
Other External Combustion	.4	23.8
Burning Of Waste Material	.0	.0
TOTALS:	80.3	131.6

TABLE C-2.
EMISSIONS FROM SOURCES REGULATED BY THE DISTRICT'S
REGULATION 8 RULES

BASE YEAR 1987 INVENTORY - Reactive Organic Emissions

Rule Number and Rule Title	TONS/DAY
4 General Solvent and Surface Coating Operations	2.8
5 Storage of Organic Liquids.....	4.8
6 Terminals and Bulk Plants.....	1.0
7 Gasoline Dispensing Facilities.....	0.8
8 Wastewater (oil-water) Separators.....	5.9
9 Vacuum Producing Systems.....	.0
10 Process Vessel Depressurization.....	.0
11 Metal Container, Closure and Coil Coating	5.5
12 Paper, Fabric and Film Coating	0.8
13 Light and Medium Duty Motor Vehicle Assembly Plants.....	3.9
14 Surface Coating of Large Appliance and Metal Furniture0
16 Solvent Cleaning Operations	3.0
17 Petroleum Dry Cleaning Operations.....	0.5
18 Valves and Flanges at Petroleum Refinery Complexes.....	15.9
19 Surface Coating of Miscellaneous Metal Parts and Products	1.0
20 Graphic Arts Printing and Coating Operations.....	1.6
23 Coating of Flat Wood Paneling	0.3
24 Pharmaceutical and Cosmetic Manufacturing Operations.....	.0
25 Pump and Comp. Seals at Petro Refineries & Chem Plants	2.8
26 Magnet Wire Coating Operations.....	0.1
27 Perchloroethylene Dry Cleaning Operations.....	3.1
28 Pres. Relief Valves at Petro. Refineries & Chem. Plants.....	0.7
29 Aerospace Assembly & Component Coating Operations.....	0.9
30 Semiconductor Manufacturing Operations.....	1.7
31 Surface Coating of Plastic Parts and Products	0.2
32 Wood Furniture and Cabinet Coatings	0.3
33 Gasoline Bulk Terminals & Gasoline Delivery Vehicles.....	0.7
34 Solid Waste Disposal Sites	0.0
35 Coatings and Ink Manufacturing	1.6
36 Resin Manufacturing	0.1
37 Nat. Gas & Crude Oil Production Facilities	0.0
38 Flexible and Rigid Disc Manufacturing	0.6
39 Gasoline Bulk Plants and Gasoline Delivery Vehicles.....	1.1

TABLE C-2. (con't)

Rule Number and Rule Title	TONS/DAY
42 Large Commercial Bread Bakeries	0.6
43 Surface Coating of Marine Vessels.....	0.1
44 Marine Vessel Loading Terminals	2.5
45 Motor Vehicle & Mobile Equipment Coating Operations.....	1.1
47 Air Stripping and Ground Water Aeration	1.4
48 Industrial Maintenance Coatings	0.9
50 Polyester Resin Operations	0.6
TOTALS	69

APPENDIX D

REDUCING POPULATION EXPOSURE

The BAAQMD performed a preliminary study to determine the extent to which Bay Area residents are exposed to unhealthy ozone levels -- ozone levels above the state standard. The measure of exposure used was person-pphm-hour for hours over 9.5 pphm of ozone. The study showed that most of the exposure to high ozone occurs in population centers in the South Bay and in the eastern parts of the District, where ozone episodes are more frequent and more severe. The study indicates that, as peak ozone levels gradually decline in response to existing and planned controls, Bay Area population exposure will decrease rapidly and will meet the requirements of the California Clean Air Act (CCAA). A number of simplifying assumptions were made for the analysis, but these assumptions should not qualitatively affect the conclusions.

The CCAA defines a "severe" air basin as one that cannot demonstrate attainment of the California ozone standard by 1997. The Bay Area falls into this severe category. The CCAA requires that severe ozone areas

... reduce overall population exposure to ambient pollutant levels in excess of the standard by at least 25 percent by December 31, 1994, 40 percent by December 31, 1997, and 50 percent by December 31, 2000, based on average per capita exposure and the severity of exceedances, so as to minimize health impacts, using the average level of exposure experienced during 1986-1988 as the baseline. (Section 40920)

Computing population exposure to ozone levels over the state standard requires population and air pollution data. Census figures were used to identify the population in a 5x5 km grid network that covers the entire Bay Area. Ozone data for all hours that exceeded the California standard during the three-year period from 1986 through 1988 were extracted from District ambient monitoring records. For each of these hours, the measured ozone values were interpolated to provide an ozone level for each grid square. Ozone exposure was then computed for each hour the

standard was exceeded in a grid square by multiplying the population of that grid square by the pphm exceedance of the standard. Aggregate ozone exposure was obtained by summing the exposures for all exceedance hours for all grid squares. These totals were then used to establish the three-year average for the baseline exposure period. Ambient exposure calculations were multiplied by a factor of 0.2 to reflect the fact that people spend most of their time indoors. The factor is based on the results of the South Coast's REHEX study. This step provides a more realistic estimate of absolute exposure, but does not affect the estimated rate of decrease.

Future exposures were estimated based on ozone reductions of 1%, 1.5%, and 2% per year. Photochemical modeling predicts a 1.5% per year ozone decrease without additional emission controls. One percent per year is a conservative lower bound. Two percent per year is the predicted ozone decrease with the implementation of the '91 CAP, based on photochemical modeling.

The exposure reduction estimates are based on several assumptions, including: (1) that ozone will decrease at the same rate everywhere in the District and (2) that trends in afternoon grid populations do not differ significantly from trends in residential census data.

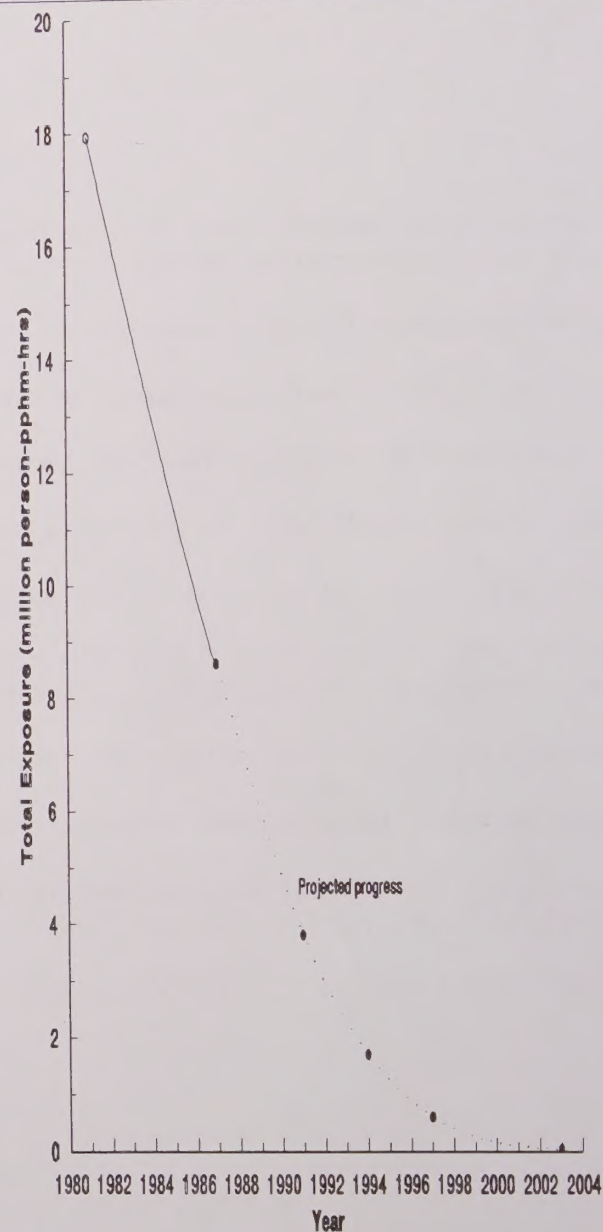
A new analysis will be completed by 1994, incorporating daytime population patterns, more modeling results, and more refined indoor/outdoor exposure patterns. The estimated rate of reduction of exposure to ozone levels above the state standard is not expected to change significantly as a result of the refinements.

The table below shows population exposure to ozone above the standard in person-pphm-hours for the total Bay Area population on a per capita basis. The exposure reductions are dramatic. If peak ozone decreases by 7% from 1987 to 1994, there would be a 53% decrease in per capita exposure. If the peak drops 10% by 1997, there would be an associated 68% decrease in per capita exposure.

Annual person-pphm-hours above standard assuming various percent reduction in future peak ozone concentrations

	Total Pop. Exp. in millions of person-pphm-hrs	Percentage Decrease	Per Capita Exp. in pphm-hours	Percentage Decrease
'86-'88 baseline exp.	8.8	0%	1.5	0%
'94--7% decrease	4.5	49%	0.7	53%
'94--10% decrease	3.1	65%	.5	68%
'94--14% decrease	1.7	81%	.3	82%
'97--10% decrease	3.1	64%	.5	68%
'97--15% decrease	1.5	83%	.2	85%
'97--20% decrease	0.6	93%	.1	94%

The District made about 5% per year progress in reducing peak ozone in the 1970s, and about 3% per year over the past decade. Thus, the 2% rate of progress assumed for future years under the CAP is reasonable and probably conservative. Based on this analysis, the Bay Area will meet and exceed the CCAA exposure targets. The accompanying graph shows the estimated reductions in person-pphm-hour exposure between 1981 and 2003. It emphasizes the finding that most of the exposure to unhealthy ozone concentrations will be eliminated by 1997, even though the District, as a whole, is not expected to attain the state ozone standard by that date.



Past and Projected Bay Area Population Exposures assuming a 2 percent per year reduction in ozone after 1987

APPENDIX E

REFERENCES

- Association of Bay Area Governments/Bay Area Air Quality Management District/Metropolitan Transportation Commission. Draft Bay Area '91 Clean Air Plan (CAP): Implementing All 'Feasible' Controls. April 1991.
- Bay Area Air Quality Management District. Addendum to Draft Bay Area '91 Clean Air Plan (CAP). 18 June 1991.
- Bay Area Air Quality Management District. Emissions Inventory Summary Report - Base Year 1987. October 1991.
- Bay Area Air Quality Management District. Emissions Inventory Source Category Methodologies - Base Year 1987. October 1991.
- Bay Area Air Quality Management District. Socioeconomic Report for the Bay Area 1991 Clean Air Plan. July 1991.
- Bay Area Air Quality Management District. Staff Report: Transportation Control Measures Plan. 16 January 1991.
- California Air Resources Board. Office of Air Quality Planning & Liaison. Answers to Commonly Asked Questions about the California Clean Air Act's Attainment Planning Requirements (CCAA Guidance Paper #1). August 1989.
- California Air Resources Board. Comment Letter on Draft Bay Area '91 Clean Air Plan. 19 August 1991.
- California Air Resources Board. List of Feasible Measures for Stationary Sources. 19 March 1991.
- California Air Resources Board. Office of Strategic Planning. Transportation Strategies Group. California Clean Air Act Transportation Requirements Guidance (CCAA Guidance Paper #2). February 1990.
- Metropolitan Transportation Commission. Final Transportation Control Measure Plan. November 1990.

U.C. BERKELEY LIBRARIES



C124904845

